This manual has been scanned by the

Vickers MG Collection & Research Association

www.vickersmg.org.uk

Please support the work of the Association.

Click on the image to donate through PayPal:



Or regularly support us through Patreon:



A not-for-profit company, limited by guarantee, registered in England, Company Registration Number 07855202

Sgt O'Meara.

FOR OFFICIAL USE ONLY.

CHAPTER 1
of
AIR PUBLICATION 1242.
(*Issued April*, 1927.)

ARMAMENT TRAINING MANUAL

PART I—CHAPTER 1

VICKERS GUNS
(AIR AND GROUND)

Issued for the information and guidance of all concerned.

By Command of the Air Council.

W F Nicholson

AIR MINISTRY.

CHAPTER 1.

CONTENTS.

Guns, Vickers, ·303-in. Air-cooled, Mk. II.	*Para.*
General description	1–2
Non-recoiling portions	3–14
Recoiling portions	15–22
Mechanism	23–35
Immediate action	36–40
Points to be observed	41–43
Stripping	44–48
Care and cleaning	49–51
Lubrication	52
Examination	53–54
Repairs and adjustments	55–60
Spare parts	61–62
Rounds counter	63
Electric heaters	64
Loading handle	65
Blank firing attachment	66
Flash eliminator	67
Guns, Vickers, ·303-in. Air-cooled Mk. I*.	
Introduction	68
General description	69
Non-recoiling portions	70–72
Stripping	73
Care and cleaning	74
Guns, Vickers, ·303-in. Ground Mk. I.	
General description	75–76
Non-recoiling portions	77–85
Recoiling portions	86–88
Mechanism	89–91
Immediate action	92
Points to be observed	93–94
Stripping	95–99
Care and cleaning	100–101
Lubrication	102
Examination	103
Repairs and adjustments	104–106
Spare parts	107
Rounds counter	108
Electric heater	109
Loading handle	110
Index giving vocabulary names of parts	111
Detailed index	112

IMPORTANT NOTE.

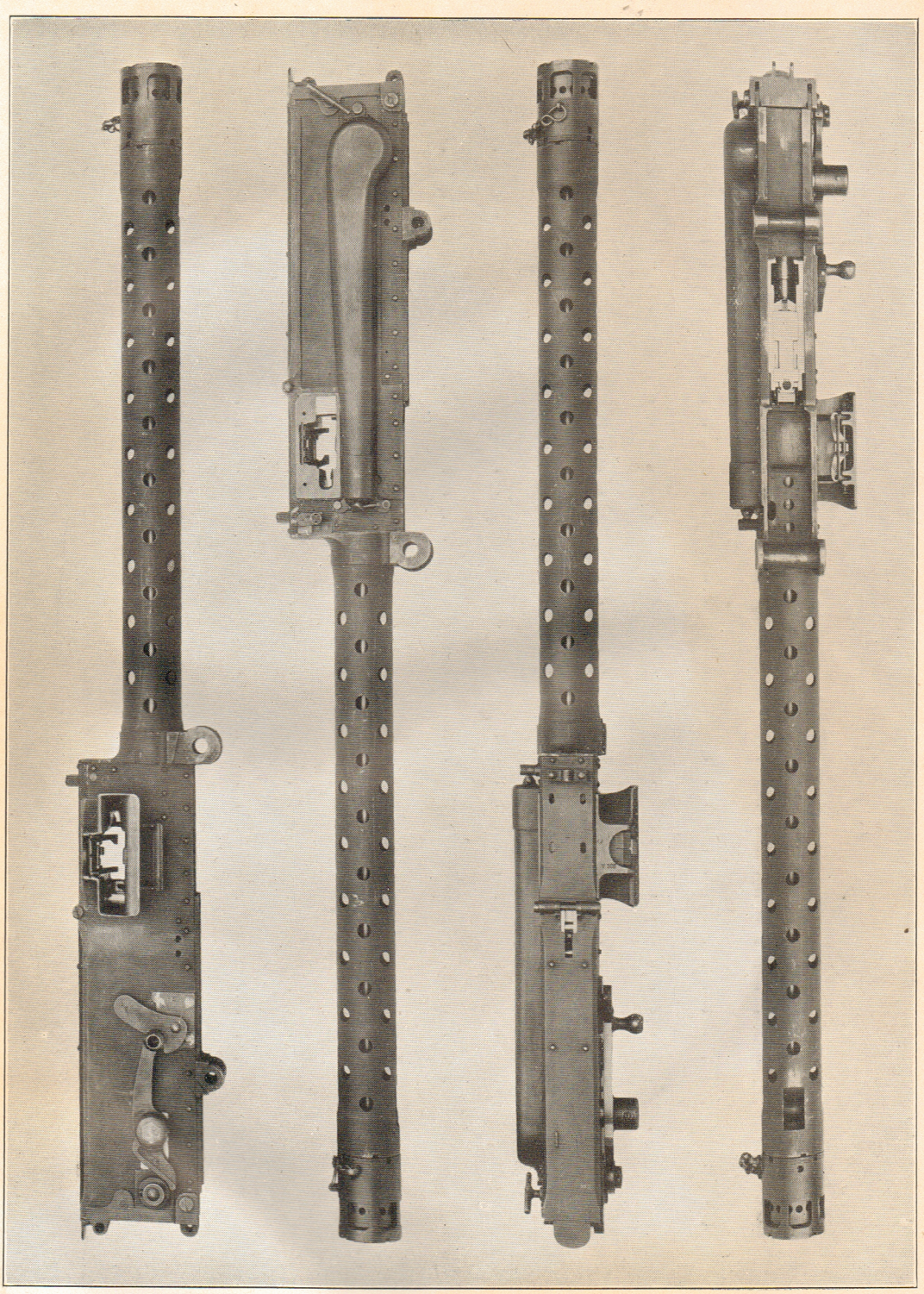
Names of parts when given for the first time are usually followed by a number in brackets. This number corresponds to the number shown against the part in the photographs or drawings and to the list of parts given in the index. The names used in the index are the correct names as they appear in the Priced Vocabulary (Air Publication 1086) and will always be used when items are demanded. The numbers mentioned above should not be used in demands, but only those shown in the Ref. No. column of A.P. 1086.

x (5)27947 Wt 21929—14552 5500 5/27 E & S

PLATES.

Plate No.	Title.
I	Vickers Gun ·303-inch Air-cooled Mk. II.
II	The Muzzle Attachment.
III	The Breech casing, etc.
IV	Right Hand feed block.
V	Left Hand feed block.
VI	Fusee Chain, Spring box, etc.
VII	The Recoiling portions.
VIII	The lock.
IX	Gun fired.
X	Backward action of the crank.
XI	Backward movement of the lock.
XII	Forward rotation of the crank.
XIII	Breech closed, gun ready to fire.
XIV	Approximate position of the crank handle for stoppages.
XV	Tools used for stripping.
XVI	Weighing the fusee spring.
XVII	Weighing the recoiling portions.
XVIII	The rounds counter.
XIX	Electrical gun heater.
XX	Loading handle fitted to gun.
XXI	Loading handle, complete and stripped.
XXII	Components of the blank firing attachment.
XXIII	Vickers Gun ·303-inch Air-cooled Mk. I*.
XXIV	Vickers Gun ·303-inch Water-cooled Mk. I.
XXV	Steam tube and spanner, muzzle cone and disc.
XXVI	Tangent rear sight.
XXVII	Rear crosspiece, etc.

PLATE I.
(Part I. Chapter 1.)



Vickers Gun, ·303-in. Air-cooled Mark II.

x 27947

GUNS, VICKERS ·303-in., AIR-COOLED, Mk. II.

1 GENERAL.

(i) **Description.**

Nomenclature	Gun, Vickers ·303-in., Air-Cooled, Mk. II.
Weight	24 lbs. (approx.).
Rate of fire	900 rds. a minute (approx.).
Type of ammunition used	All types of Mk. VII ammunition except Mk. VII R.T.S.
Bore of barrel	·303 in.
Length of barrel	28·4 in.
Twist	1 in 10.
Type of rifling	Enfield left hand.
Number of grooves	Five.
Working weight on fusee spring	10–12 lbs.
Length of gun overall (excluding round counter)	41½ in.
Marks on gun	(*a*) The *Number of the Gun* is shown on the front end of the body, above the barrel casing. (*b*) The *Gun Testing Section Mark* (consisting of two crossed ·303-in. cartridges in miniature) is stamped on :— (1) At the crank handle end of the crankshaft. (2) On the upper face of the barrel trunnion block, and on some guns— (3) At the muzzle end of the barrel casing.
Type of sights	Nil (separate store).

(ii) **Control of fire.**

The gun is automatic in the sense that a continuous pull on the trigger will cause all the shots in the belt to be fired. It is not automatic when fired by the "Constantinesco" synchronising gun-gear, as this apparatus, whilst ensuring that the gun only fires at definite required intervals, automatically controls the trigger action of the gun (*see* Part I, Chapter 9).

(iii) **Cooling System.**

The gun is cooled by the air-flow over the barrel. It is not intended that the gun should be used for land service.

(iv) **Heating system.**

The gun may be fitted with electric heaters to prevent it from being jammed by thick oil, congealed by intense cold, at high altitudes.

2. GENERAL DESCRIPTION OF PARTS.

For purposes of detail the gun is divided into two parts, viz. :—

(i) The non-recoiling portions.
(ii) The recoiling portions.

THE NON-RECOILING PORTIONS.

3. GENERAL.

The non-recoiling portions consist of the following parts :—

(i) The *Barrel Casing*, which includes the *Gland* and the *Muzzle Attachment*.
(ii) The *Trunnion Block*.
(iii) The *Breech Casing*.

4. THE BARREL CASING.

(i) **The barrel casing** is made of steel and has holes drilled in it to allow the air to have access to the barrel for cooling purposes.

(ii) **The exterior of the barrel casing.**

(*a*) On the front end of the casing is fitted the *Muzzle Attachment*. This consists of the following portions—*the Gland* (4); *the Muzzle Attachment Outer Casing* (1); and the *Muzzle Cylinder* (2).

(*b*) The *Muzzle Attachment Outer Casing* (1) is a hollow cylinder threaded internally at its front end to receive the *Muzzle Cylinder*. Behind this portion are six rectangular *Vents* (size about 1 in. by $\frac{3}{4}$ in.) for the escape of gas. Immediately behind is a threaded hole to take the *Stud* to which is attached the *Chain* carrying the *Split Pin* (3) by which the muzzle attachment outer casing and the *Gland* (4) are locked together. Internally at the rear end are three rectangular projections which form an interrupted flange for connection with the gland, one of these projections having a small stop. At the centre of each of these projections the outer casing is bored to accommodate the split pin mentioned above.

(*c*) The *Muzzle Cylinder* (2) is of substantial construction. Four slots are cut on its outer circumference for fixing and removing it by means of the *Combination Tool* (86). Behind these the diameter is slightly smaller and is threaded to screw into the muzzle attachment outer casing. Behind this the diameter is again slightly smaller and plain. This portion has sixteen holes drilled in it to allow the gases to escape through the vents in the muzzle attachment outer casing. The muzzle cylinder is bored longitudinally to allow the bullets to pass through it.

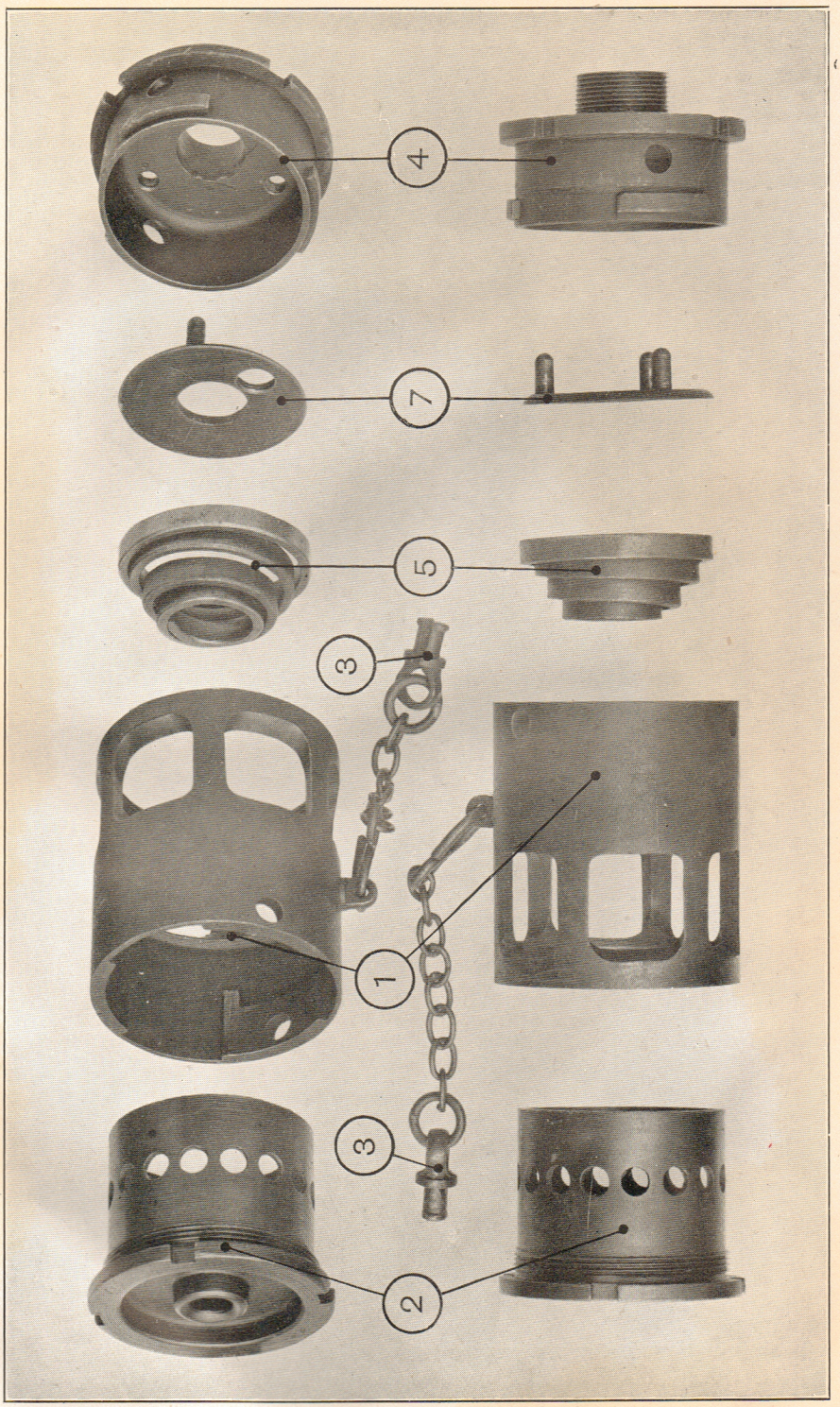
(iii) **The muzzle gland** (*a*) The *Muzzle Attachment* is fastened to the end cap of the barrel casing by means of the *Muzzle Gland* (4). This gland is circular and hollow. At its front it has three exterior projections which form an interrupted flange corresponding to that on the muzzle attachment outer casing. Beyond these are three holes to take the split pin which locks the gland and the muzzle attachment outer casing together. Immediately behind on a projecting rim are four slots for fixing and removing the part by means of the *Combination Tool*. At the centre of the rear face is a circular boss bored to accommodate the barrel and threaded externally to screw into the end cap of the barrel casing.

(*b*) The *Gland* contains the *Buffer Spring* (5). This is a strong spiral spring shaped into $3\frac{3}{4}$ to $4\frac{1}{4}$ flattened coils, and is fitted with its centre over the barrel, with the large diameter coil to the rear of the gun.

(*c*) Behind this spring is fitted the *Locking Washer* (7). This consists of a disc $1\frac{3}{4}$ in. in diameter with one edge rounded and a hole ·65 in. in diameter in the centre. In the face of the washer three studs are fitted, placed at equal distances, and mid-way between two of these studs a hole is tapped to a size to take the threaded portion of the *T-fixing Pin* (13). These studs fit into three corresponding holes in the face of the muzzle gland and project through that into three other holes in the *Barrel Bearing* or *End Cap*. The threaded hole is provided so that the T-fixing pin can be used as a means of fitting or removing the washer.

(iv) **The barrel bearing** (or end cap) is screwed into the front end of the barrel casing and is permanently fixed to it. The barrel bearing is bored to receive the *Front Packing* which consists of *Asbestos String* (6) teased out and wound into the recess of the barrel bearing. Behind

PLATE II.
(Part I. Chapter 1.)



The Muzzle Attachment.

the front packing is a shoulder which allows the front packing to be compressed by the threaded boss of the gland.

(v) **The under-side** of the barrel casing has an inturned indentation which serves as a guide for entry of the barrel into the barrel bearing. Seventy-six holes are drilled in the outer casing so as to allow free entry of air to cool the barrel.

(vi) **The rear end of the barrel casing** is screwed and soldered into the trunnion block.

(vii) **The interior of the barrel casing** is plain and browned to protect it from corrosion.

5. THE TRUNNION BLOCK

(i) The *Trunnion Block* forms the joint between the *Barrel Casing* and *Breech Casing*.

(ii) The front portion is cylindrical, threaded internally to take the rear end of the barrel casing. From the sides of this portion and produced downwards on either side are two *Lugs*. Both lugs are drilled and are joined together by the *Trunnion Block Distance Bush*, thus forming the *Front Mounting Bracket* of the gun.

(iii) Above the cylindrical portion is a flat vertical extension which forms the front end of the breech casing. This extension has two wings produced to the rear, both being drilled to take the front cover catch, the left one in addition being fitted with a stop for the front cover catch. Each of these wings is riveted to the top of the front end of the outside plates of the breech casing.

(iv) The trunnion block extends to the rear in hexagonal form in line with the axis of the barrel casing. It is bored through to receive the breech end of the barrel, the rear end acting as a bearing surface or sleeve. Three rivets on each side of the front portion of this extension attach this part of the trunnion block to the outside breech casing plates.

(v) The bottom side of this extension is the front portion of the bottom plate of the breech casing, and at right angles to the bottom plate at either side are two flanges carried along the whole length. These are fastened by rivets to the outside plates of the breech casing. This bottom plate is longer than the bearing surface or sleeve and is cut out in the form of a " U," the base of the " U " serving as a *Seating for Ejection* of the empty cartridge cases. The sides of the " U " give support to the front portions of the inner side plates when the recoiling portions are forward and to the breech end of the barrel when the recoiling portions are back. Three circular holes are drilled at the front end of this portion for lightness. A fourth hole, oval in shape, is provided to enable the lower stud of the fusee spring front anchorage to be riveted in manufacture.

THE BREECH CASING.

6. RIGHT AND LEFT OUTSIDE PLATES.

(i) These plates extend from the trunnion block to the rear of the gun.

(ii) At the top of each plate is a hole for the *Front Cover Catch* (8). Just behind, both plates are cut away at the top to accommodate the *Feed Block* (9) or (43). Immediately behind this cut-away portion there is on each plate a projection, bored to take the *Joint Cover Pin* (10). Along the upper edges both plates carry flanges which fit into grooves on the rear cover, thus ensuring stiffness.

(iii) At the rear end the plates have rectangular slots in which the crank bearings move, these slots being partially closed by the *Right Slide* (11) and *Left Slide* (12). Above the slotted portion each plate has a hole to accommodate the *T-fixing Pin* (13). At the bottom of each plate is another hole which takes the *Rear Crosspiece Axis Pin* (14), the corners of the plate being here rounded to give clearance for the movement of the *Rear Crosspiece* (31). At the rear of the plates are two projections which fit into slots in the rear crosspiece.

(iv) On the inside of each plate at the front end is a *Solid Cam* by means of which the movement of the extractor is partially controlled. Near the rear end of each of these cams and on the top sloping surface a *Step* is cut, so that the lock may be hindered from going forward if the horns of the extractors have failed to drop in the backward movement. The details given above are common to both plates. Peculiar features possessed by either are as follows :—

(*a*) **Right outside plate (exterior).**—Rather more than half-way along there is the *Check Lever Bracket* (15), which is a cut-away rectangular bracket riveted in position. Fastened to this is a stud on which the *Check Lever* (16) is pivoted and to which it is secured by a small *Keeper Pin* (17). The check lever is cut away to receive the end of the *Crank Handle* when the gun is in the firing position, and its travel is limited by a stud which moves in a slot in the check lever bracket.

(*b*) In front of the check lever bracket are two holes for the *Binding Posts* of the *Electric Heaters* (*see* para. 64); a third and smaller hole is drilled to the rear of the check lever and is utilised for riveting the heater unit in position.

(*c*) The right slide carries the *Roller* (18), this being held in position by a *Collar* (19) and brass *Split Pin* (20).

(*d*) **The left outside plate (exterior).**—Near the front end and at the top is a stop which limits the movement of the lever of the front cover catch, the plunger of the latter being accommodated by a groove in the stop.

(*e*) Immediately behind and below are two *Studs* for holding the front end of the *Fusee Spring Box* (52). Longitudinally, on the outside, the plate is milled out, ribs being left for strengthening purposes.

(*f*) The left slide carries a *Stud* to which the rear end of the fusee spring box is secured.

(*g*) Two holes are drilled near the lower rear end for the *Binding Posts* of the *Electric Heater* (*see* para. 64); a third and smaller hole is drilled in front of the two larger holes and is utilised for riveting the heater unit in position.

7. THE FRONT COVER (21).

(i) The *Front Cover* closes the top of the recess which accommodates the *Feed Block*.

(ii) At its front end, on the lower side, is riveted a plate carrying the *Hooks* by which it is secured.

(iii) On the top, near the front, is an *Anchorage* (22) for the C.C. gear trigger motor adjustment screw. This anchorage is riveted on to the front cover by the rear pair of front cover catch rivets. (In certain guns bolts replace these rivets.)

(iv) The lower surface is milled out almost to the rear, a rib being left on either side to fit inside the flanges on the feed block. For a short distance, at the front, this rib is knurled externally to give a grip when the cover is raised.

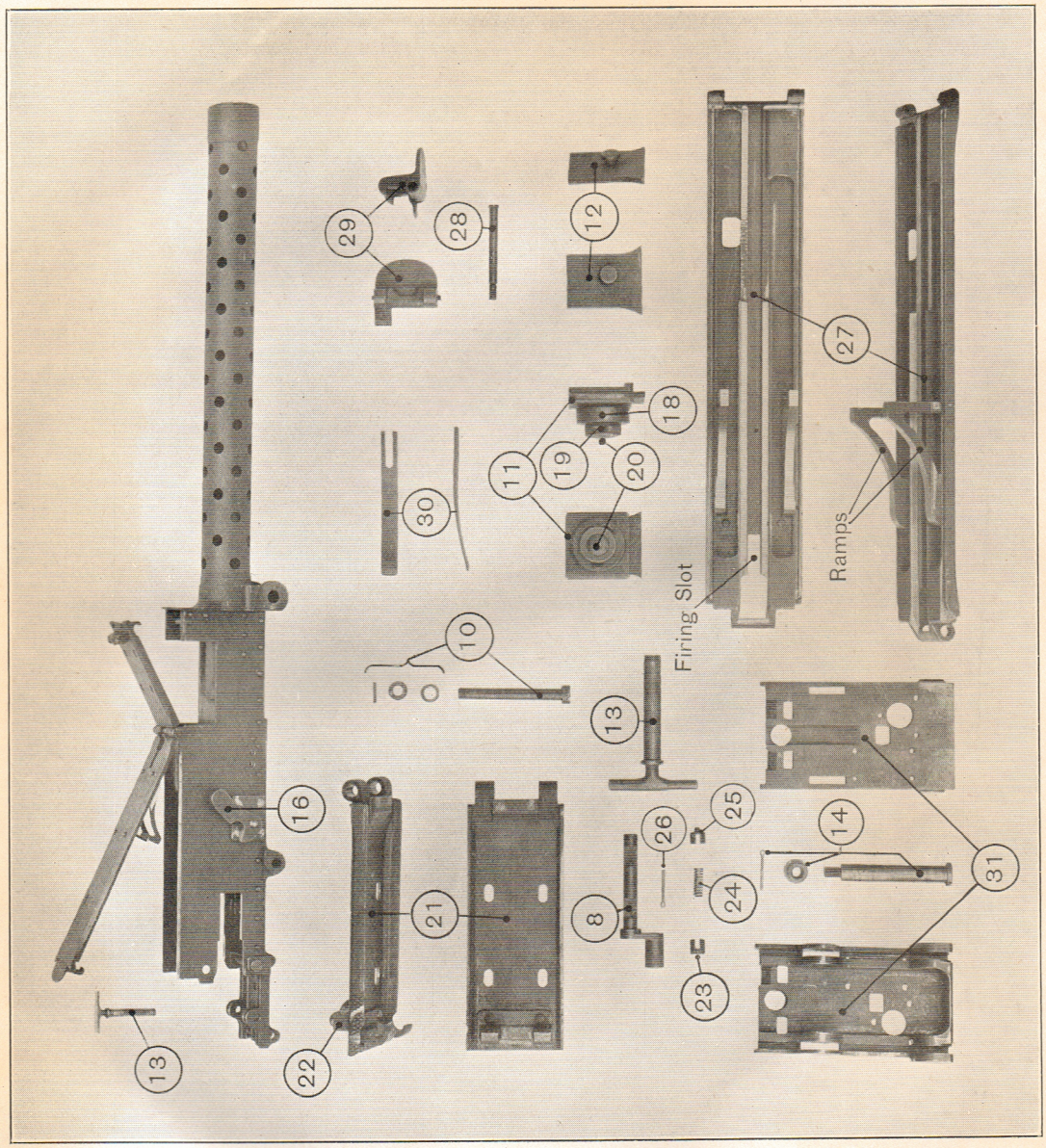
(v) At the rear end, on the under-side, is a projection forming the *Extractor Stop*.

(vi) Where the front cover is hinged to the rear cover, it has an enlarged portion, cut away in the middle and bored to accommodate the *Joint Cover Pin* (10).

(vii) Four holes are drilled and slotted in the front cover for attachment of the trigger motor of the C.C. gear.

(viii) The *Front Cover Catch* (8) extends from the right to the left outer side plates, and comprises a circular bar having two flats cut into it. On the left is the *Front Cover Catch Lever* which is in the shape of a handle, the horizontal arm being hollowed out to contain the *Front Cover Catch Plunger* (23), *Spring* (24) and *Plug* (25). When the lever is turned up the front cover hooks are in line with the flats on the front cover catch and the cover may be raised. When the lever is lowered, the front cover hooks are retained by the circular portion of the catch. The outer end of the lever is knurled to form a finger grip. The catch is bored near the left end to receive a *Split Pin* (26) which prevents its withdrawal from the gun.

PLATE III.
(Part I. Chapter 1.)



8. THE REAR COVER (27).

(i) At the front end of the rear cover is an enlarged portion cut away on each side and bored to admit the *Joint Cover Pin* (10).

(ii) On the under-side are grooves on the extreme right and left and running the whole length of the rear cover, to accommodate the flanges on the outer side plates. The under-side is milled out into three channels, the centre channel and ribs forming guides for the top of the lock frame.

(iii) In the side channels are riveted the *Ramps* which are roughly triangular in shape, the longest side being curved. For a description of the use to which the centre channel is put, *see* Ground Gun, para. 82.

(iv) At the front end of the centre channel is the *Firing Slot* through which the *Trigger Motor Push Rod* controls the operation of the gun.

(v) At the rear end of the cover are two cut-away projections bored to accommodate the *Rear Cover Lock Axis Pin* (28). The *Rear Cover Lock* (29), which pivots on this pin, is right-angled in shape and consists of a small semicircular plate with three projections. Two of these are in the form of hooks which engage in recesses in the rear crosspiece. The third is a lug on which the *Rear Cover Lock Spring* acts. The curved plate extends behind the breech casing and serves as a thumb piece for lifting the cover. The movement of the rear cover lock is limited by two small lugs, one on each side, which engage in recesses in the projections at the rear of the cover itself. The rear cover lock is held down by the action of the *Rear Cover Lock Spring* (30) which is flat and lies on the left channel on the under-side of the cover. The front end of this spring is slotted to fit under a T-shaped stud which serves it as an anchorage. The rear end of the spring presses on the lug on the rear cover lock as already described.

9. THE REAR CROSSPIECE (31).

(i) The *Rear Crosspiece* consists of a plate which closes the rear end of the gun.

(ii) On its inner side, to right and to left, are ribs forming two grooves which accommodate the rear edges of the outer side plates. At two points on each side, these ribs have enlarged portions, bored to receive respectively the T-fixing pin and the *Rear Crosspiece Axis Pin* (14).

(iii) At the bottom, joining the lower pair of projecting portions, is a horizontal plate which, when in its normal position, forms a part of the bottom plate of the breech casing.

(iv) At the top on the left, the inner side of the plate is bevelled to give clearance for the movement of the rear cover lock spring.

(v) In the middle, near the top, are three holes, the centre one being circular (for its use, *see* description of Ground Gun, para. 83), while those to the right and left are rectangular and provide a grip for the hooks of the rear cover lock. At the top the plate is bevelled to the right and to the left for the guidance of the hooks on the rear cover lock.

(vi) Two slots are cut through in the bottom of the groove opposite to the enlarged portions for the T-fixing pin. These grooves receive and hold the projections on the ends of the right and left outer side plates.

(vii) There are seven small threaded holes and one large circular one in the lower half of the rear crosspiece. These are required in connection with the *Rounds Counter*, for a description of which, *see* para. 63.

(viii) There are various lugs, a groove and a square hole in the rear crosspiece, which are only used in ground guns, for the hand-controlled trigger attachments. *See* description of Ground Gun, para. 83.

10. THE T-FIXING PIN (13).

The *T-fixing Pin*, as the name indicates, is T-shaped. The longer arm is threaded externally at the end to screw into the flange on the right of the rear crosspiece. Near the other end of this arm is a collar which positions the T-fixing pin on the flange on the left side of the rear

crosspiece. The head of the T-fixing pin is of two different diameters, the smaller of which enables it to be used to push out the split pin from the side levers axis bush when the lock is being stripped, and also the split pin holding the top and bottom levers together in the feed block. For this purpose the end of this arm is slightly hollowed out.

11. THE BOTTOM PLATE.

The bottom plate consists of two portions :—

(i) That portion of the trunnion block described in para. 5 (v) and

(ii) The rear portion.

(*a*) This consists of parallel L-shaped side members joined together at the rear end by a flat piece of metal, which fills up the rear portion of the bottom of the breech casing. The vertical portions of the L-shaped part of each side member fit inside the right and left outside plates and are fastened to these plates by rivets. The front portion of each side member is thickened. Two notches are cut into the front top of the right side member to give clearance to the binding parts of the electric heater. Two similar notches are cut into the rear top of the left side member.

(*b*) On the under-side of the rear bottom plate are two lugs bored and joined together by a *Distance Bush.* These lugs form the *Rear Mounting Bracket.* The outside of the right-hand lug is chamfered at the top rear corner to give clearance to the tail of the crank handle.

FEED BLOCK.

12. RIGHT HAND FEED BLOCK (9).

(i) **Exterior** (32).

(*a*) The *Feed Block* is made of either steel or gunmetal and fits into a recess in the outside plates of the breech casing. It is covered and held down, when in position, by the front cover.

(*b*) At the front is a *Boss* bored vertically to accommodate the *Axis Pin* (33) of the *Top* (34) and *Bottom Levers* (35). Ribs are provided for positioning the feed block in the gun. Behind the projection the feed block is milled out at the top and at the bottom, ribs being left for positioning and strengthening. Immediately to the rear of this milled portion the feed block is cut away in the middle, and has transverse grooves to accommodate the *Slide* (36).

(*c*) On the right, opposite to the cut-away portion, the upper surface of the feed block is recessed.

(*d*) At the rear, the upper part is milled out, ribs being left as before. The rear face is cut away to allow the cartridge to be drawn out, the part on the left acting as a *Cartridge Stop.* There are also grooves to accommodate the ribs on the face of the extractor. At the top of the right groove, a small projection is left as a guide for the cartridge rim.

(ii) **Interior.**

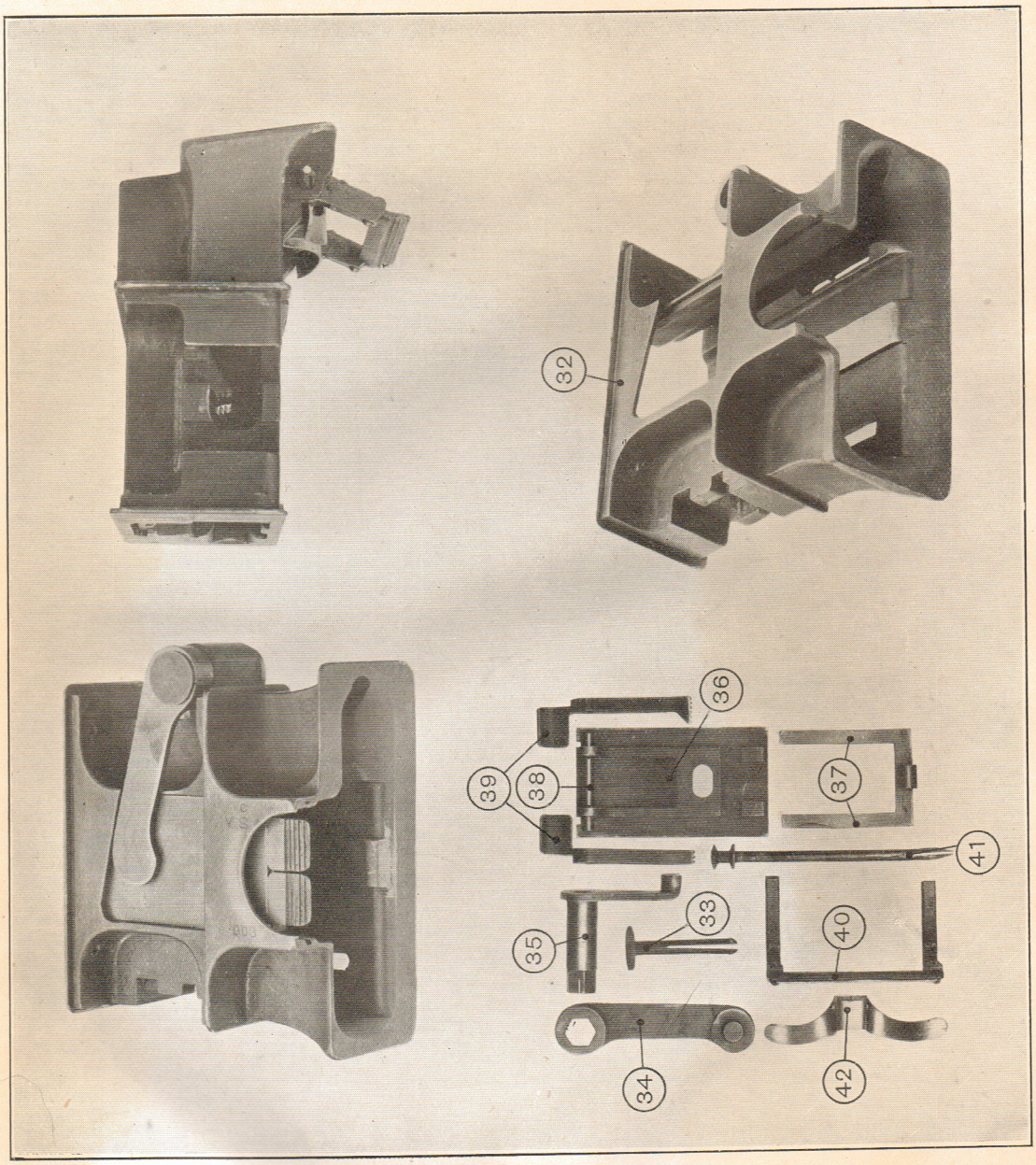
(*a*) The feed block is hollowed out to admit the cartridges, guides being provided at the front and rear to ensure that the rounds are brought to exactly the correct position.

(*b*) At the bottom is a rib which acts as a bearing surface for the belt as it is fed in. At the front on the right is a bevelled portion which serves as a guide for the noses of the bullets, while towards the left side are two projections which form the *Bullet Stop.*

(*c*) At the rear are two raised portions above and below, and rounded off on the right face, which serve as guides to the rims of the cartridges.

(*d*) At the front and rear and slightly to the right are slots through which the *Bottom Pawls* project into the feed block.

PLATE IV.
(Part I. Chapter 1.)



Right-hand Feed Block.

x 27947

(iii) **The bottom lever** (35).

The *Bottom Lever* is right-angled in shape. The horizontal arm is flat and has on the under-side a semicircular projection which engages in the *Recess in the Prolongation of the Left Inner Side Plate.* The other arm is bored to receive the *Split Pin* (33) which secures the part to the top lever and is cylindrical, except at its upper end, where it is hexagonal. This arm fits into and moves in a *Boss* on the front side of the feed block.

(iv) **The Top Lever** (34).

The *Top Lever* is bored at its front end to fit the hexagonal part of the bottom lever. At the rear end on the under-side is a stud which engages in the slot in the slide. The top and bottom levers are secured together by a *Split Pin* having a flat head.

(v) **The slide** (36).

The *Slide* moves transversely in the feed block under the influence of the stud on the top lever, the stud being accommodated in an elongated hole bored through the slide slightly to the left. On the under-side the greater part is milled out. On the left are two projections which form the seating for the *Top Pawls Spring* (37). On the right are two other projections bored to receive the *Top Pawls Axis Pin* (38). The right side of the top slide has two small recesses to accommodate projections on the top pawls.

(vi) **The top pawls** (39).

There are two *Top Pawls.* They are bored to receive the *Top Pawls Axis Pin* (38) on which they pivot. The left extremity of each pawl is milled to control the movement of the rounds more effectively. The front pawl has also an enlarged head. At the right extremity of each pawl is a small curved plate milled to form a *Finger Piece.* On each of these finger pieces is a small projection fitting into the slide.

(vii) **The top pawls spring** (37).

The *Top Pawls Spring* is flat and U-shaped and carries on the left a projection for fixing and removing it.

(viii) **The bottom pawls** (40).

The *Bottom Pawls* are connected with each other by means of a milled plate, to which they are riveted, the three portions forming one U-shaped right-angled part. The pawls are bored to admit the *Bottom Pawls Axis Pin* (41) on which they pivot, this pin having an enlarged head at one end and a split portion at the other.

(ix) **The bottom pawls spring** (42).

The *Bottom Pawls Spring* is a double spring (butterfly shaped) which is retained in position by the bottom pawls axis pin.

13. LEFT HAND FEED BLOCK.

(i) **Exterior** (44).

(*a*) The *Left Hand Feed Block* is very similar in shape to the *Right Hand Feed Block* except that where, in the description of the former, " right " and " left " are used, the words " left " and " right " respectively should be substituted.

(*b*) The left hand feed block is placed in position with the feed opening to the left of the gun.

(*c*) At the front there are *Two Bosses* bored vertically, the right hand one to accommodate the axis of the bottom lever and the left hand one to take the axis of the top lever.

(ii) **Interior.**

This is similar to that of the right hand feed block. The slots in the bottom of the right hand feed block are omitted. Similar slots, however, are cut through the top for pawls which serve the same purpose as the bottom pawls. These are described as *Retaining Pawls.*

(iii) **The bottom lever** (35).

There is no difference between the *Bottom Levers* of the two feed blocks. That of the left hand feed block fits into and moves in the right hand boss on the front side of the feed block.

(iv) **The top levers.**

There are two top levers in the left hand feed block :—

(*a*) The *Top Lever Cam* (45) is a short lever bored at one end to fit the hexagonal portion of the bottom lever axis. The other end on the under-side is fitted with a stud to engage in one of the arms of the *Top Slide Lever.* The *Top Lever Cam* is secured to the bottom lever by a *Split Pin* (31) having a flat head.

(*b*) The *Top Slide Lever* (46) has an axis, a short lever and a long lever. The axis moves in the left hand boss on the front end of the feed block. The short lever is at right-angles to the axis and has a recess cut into it which is engaged with the stud on the top lever cam. The long lever is also at right-angles to the axis and in addition is at right-angles to the top short lever. The axis end is bored for lightness and at the other end on the under-side is a stud which engages in a slot in the slide. The whole of the top slide lever is kept in place owing to the fact that the short arm of the top slide lever fits under the top lever cam.

(v) The *Slide* is the same as that in the right hand feed block.

(vi) The *Top Pawls* are similar in shape to those for the right hand feed block. The left extremities, however, are fitted with *Finger Pieces*, and the right extremities consist of the milled heads to control the movement of the rounds. The pawl with the enlarged head is at the rear.

(vii) The *Top Pawls Spring* is identical to the right hand feed block top pawl spring.

(viii) There are no bottom pawls. They are replaced by the *Retaining Pawls* (47) which are fitted to the top left hand side of the feed block. They are connected with each other by a milled plate to each end of which one pawl is riveted, the three portions forming one U-shaped part. The pawls are straight, whereas those in the right hand feed block are bent to form a right angle. The middle of each pawl is enlarged and there is an axis boss on the right and left sides respectively, bored to take the *Retaining Pawls Screwed Axis Pins* (48). These pins are screwed into the two bosses on the top left side, one at the front and the other at the rear, of the feed block. The protruding ends form axes for the retaining pawls. These pins are only threaded for a distance sufficient to screw into the bosses, the remaining portion of the pin being plain. The milled heads of these pawls protrude through the two slots cut in the top portion of the feed block.

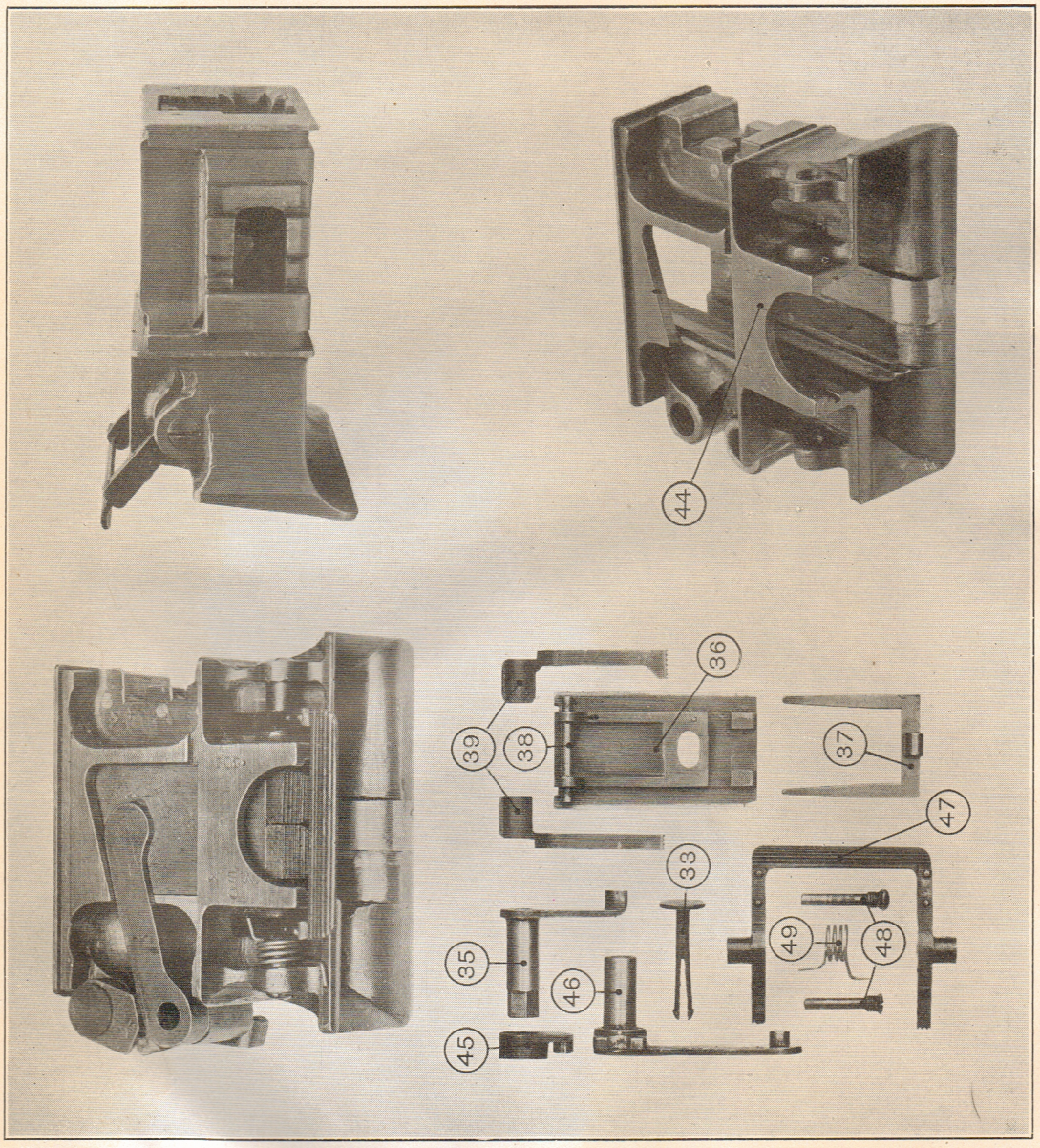
(ix) The *Retaining Pawls Spring* (49) is a spiral spring made of plated piano wire, with projecting portions at each end, and fits over the axis of the front retaining pawl. One projection bears against the feed block body, the other against the milled head end of the front retaining pawl.

FUSEE, &c.

14. THE FUSEE AND CHAIN (50), FUSEE SPRING (51) and FUSEE SPRING BOX (52).

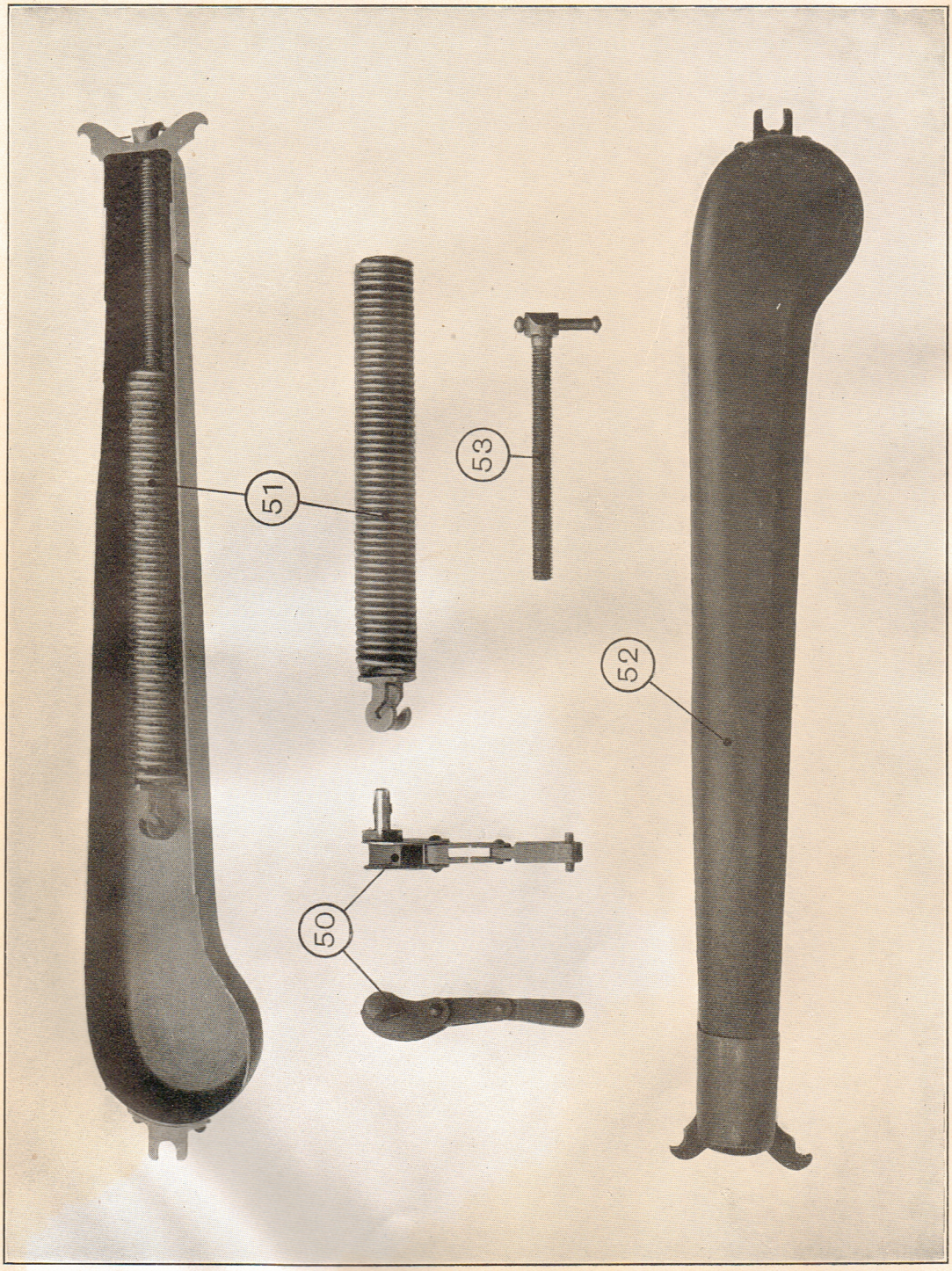
(i) **The fusee** consists of a curved lever and axis pin. The lever is slotted to take the two links of the *Fusee Chain.* The top end of the lever is bored to admit the pin by which the

PLATE V.
(Part I. Chapter 1.)



Left-hand Feed Block.

PLATE VI.
(Part I. Chapter 1.)



Fusee Chain, Spring Box, &c.

x 27947

fusee and chain are fastened together. At the lower end of the lever and on the inner side is the axis pin which fits into a hole bored into the left hand end of the crank. The axis pin has two machined lugs for positioning it relative to the crank, and two feathers for preventing withdrawal from the crank when the gun is assembled.

(ii) **The fusee chain** consists of two links, one being solid while the other is hollow. At the front end of the solid link are two small projections which fit into the hooks at the rear end of the fusee spring.

(iii) **The fusee spring** (51) is a strong spiral spring made from hard drawn wire, specially hardened and tempered, fastened at its front end to a circular brass plug which is bored and threaded internally to receive the *Adjusting Screw.* At the rear end of the spring is fastened an attachment which has two hooks projecting to the rear.

(iv) **The adjusting screw** (53) is bored at the front end to admit the *Vice Pin* by which the tension of the fusee spring is adjusted. The head of the adjusting screw bears on the front side of the *Fusee Spring Box*, which forms the anchorage. Behind the head of the tension screw are two small projections which fit into recesses on the front of the fusee spring box. To the rear of the head, the adjusting screw is threaded externally to connect with the brass plug on the fusee spring.

(v) **The fusee spring box** (52) is an elongated casing provided with two hooks at the front end and a fork at the rear, by means of which it is attached respectively to the left outer side plate and the left slide. The front end is bored to take the adjusting screw and recessed to accommodate the projections on the rear of the head of the adjusting screw. The upper edge of the box is slightly cut away near the front to clear the feed block. The lower edge is cut away towards the rear to clear the middle rib on the left outer side plate.

THE RECOILING PORTIONS.

15. GENERAL.

The recoiling portions consist of the following parts :—

(i) The *Barrel* together with the *Muzzle Cup.*
(ii) The *Inner Side Plates.*
(iii) The *Crank* including the *Crank, Crank Handle* and the *Connecting Rod.*
(iv) The *Lock.*

16. THE BARREL MK. II. (54).

(i) The *Barrel* is 28·4 inches long. At the muzzle end on the outside it is threaded (right hand) and to the *Muzzle* end is screwed the *Muzzle Cup* (55). Near the breech end is a cannelure or groove to take asbestos packing. Behind the cannelure the barrel is cylindrical until the *Barrel Block* is reached. Forward of the cannelure the barrel tapers down in three stages to within four inches of the muzzle end, the remaining four inches being cylindrical.

(ii) The *Barrel Block* is square. The *Barrel Trunnions* project from two opposite sides of the barrel block. At the rear end of the barrel are *Vertical Grooves* to accommodate the ribs on the face of the extractor on the lock. The upper mouth of the chamber is bevelled off to act as a guide for the nose of the bullet when the cartridge is entering the chamber. When the barrel is assembled in the gun this *Bullet Guide* should be uppermost.

(iii) The barrel is bored longitudinally and rifled, having five grooves and lands with a left hand twist.

(iv) From the face of the barrel block the bore is opened out to form the *Chamber* which corresponds to the shape of the cartridge case. In front of the chamber the bore is coned for a distance of ·6 inch forming a lead for the bullet into the rifling, this portion of the bore being called the *Lead*.

(v) The lower lip, in addition to the upper lip of the chamber is bevelled off to assist the feed of the cartridge into the barrel. The bevelling on the lower lip is very slight. The rim of the cartridge overhangs the vertical grooves so that the ribs of the extractor may grip the round.

17. THE MUZZLE CUP (55).

The muzzle cup consists of a circular cup-shaped disc having a central screwed boss for attachment to the screwed end of the barrel. On the outside of the boss are four grooves to take the combination tool [*see* para. 44 i (*a*)].

18. THE RIGHT AND LEFT INNER SIDE PLATES (56).

(i) For the greater part of their length both plates are milled out on the outer side, a rib being left on the centre line to stiffen it.

(ii) At the front end they are bored to receive the barrel trunnions.

(iii) Near the front end and on their inner face *Side Plate Springs* (57) are riveted, which ensure that the horns of the extractor do not drop below the solid cams on the outer side plates during the initial backward movement of the lock, when there are no cartridges on the face of the lock.

(iv) At the bottom of each side plate is a *Guide Rib* from front to rear, along which the flanges of the lock move. Each of these guides has two interruptions to enable the lock to be lifted out.

(v) Near the rear end of each plate is a square reinforced portion bored to form a bearing for the crank.

(vi) Immediately behind, both plates have extensions for the exclusion of grit from the slots in the outer side plates. Two holes are drilled in the rear extension of the right inner side plate to take the rivets holding in position the operating angle bracket for the rounds counter mechanism (*see* para. 63).

(vii) The front end of the left inner side plate is extended and recessed, the recess being known as the *Recess in the Prolongation of the Left Inner Side Plate*. This recess engages with the stud on the lower lever of the feed block. The rear face of the recess is specially hardened.

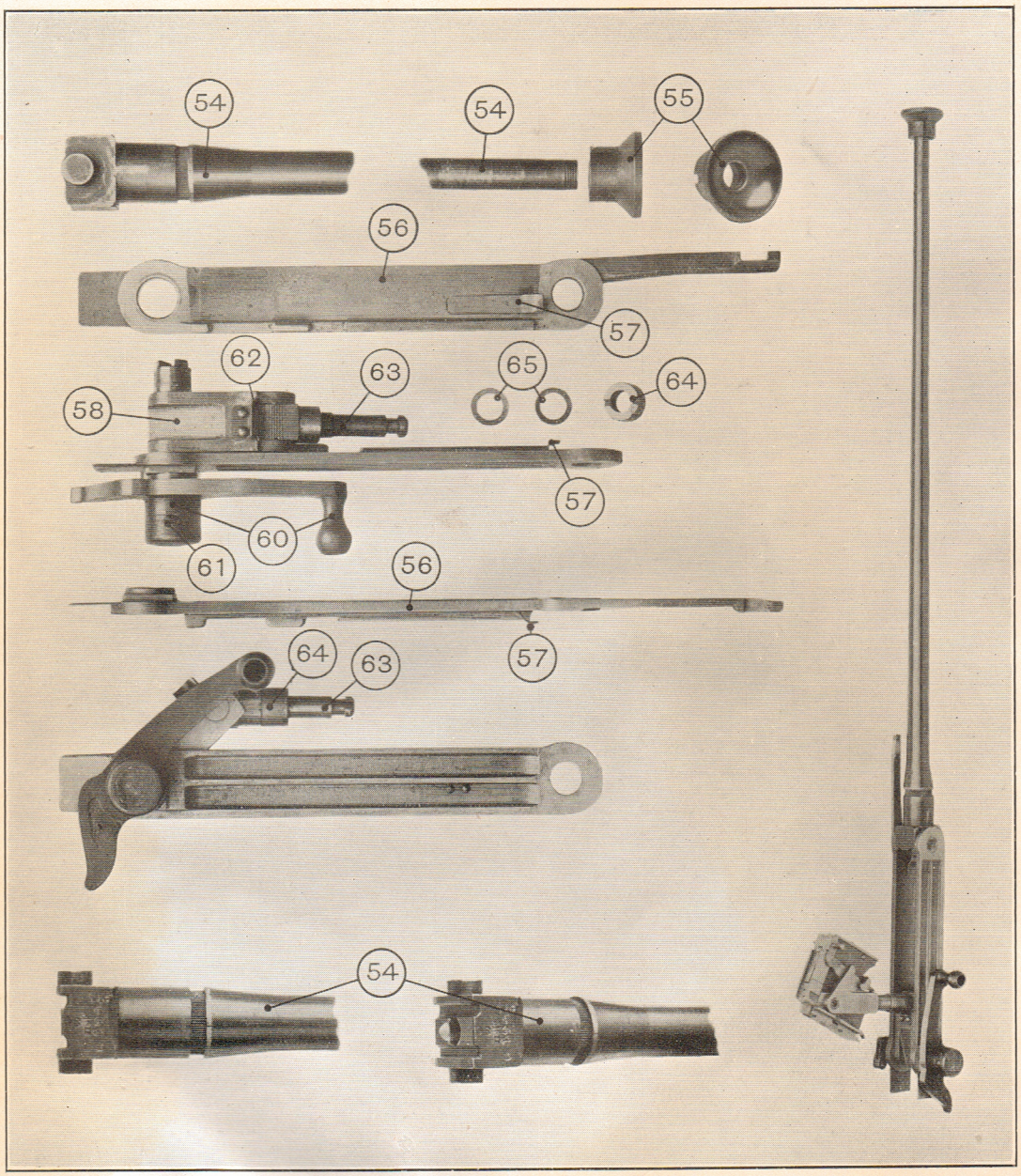
19. THE CRANK (58).

(i) The *Crank* is cut away on both the upper and under-side, to allow for the movement of the tail of the sear in the lock and the connecting rod, respectively, during the action of the gun. At the front end it is bored transversely to admit the *Crank Pin*, which is located by a *Locking Pin* (59).

(ii) At the rear of the crank are circular projections to the right and to the left, which are carried in bearings in the inner side plates. The projection on the left is bored to accommodate the *Fusee*, the feathers and lugs on the latter being received in keyways and a groove, so ensuring correct fit and driving action. The projection on the right carries the *Crank Handle* (60) for which purpose it is hexagonal in shape at the extremity. The handle is secured in position by a *Screw Fixing Pin* (61).

(iii) On the top of the crank are two rivet holes for attaching the *Connecting Rod Spring* (62). This is fitted to enable the connecting rod to be kept upright when the lock is removed from the gun.

PLATE VII.
(Part I. Chapter 1.)



The Recoiling Portions.

20. THE CONNECTING ROD (63).

(i) The *Connecting Rod* pivots freely upon the crank pin.

(ii) At the front it is circular and fitted with three projections which secure its connection with the lock.

(iii) About halfway along is an external thread which accommodates the *Adjusting Nut* (64). By this means, *Washers* (65) being inserted behind the *Adjusting Nut*, if necessary, the position of the connecting rod in relation to the lock is regulated, this in turn regulating the distance between the face of the extractor and the breech face of the barrel.

(iv) The rear part of the connecting rod is rounded and milled on its upper surface to provide a finger grip.

21. THE CRANK HANDLE (60).

(i) The *Crank Handle* forms, approximately, a flat curve. At the front end it is fitted with a knob set horizontally and at right angles.

(ii) Rather more than halfway along on the right-hand side, there is a *Boss* bored hexagonally to fit the right extremity of the crank. Behind the boss is the *Hump* which curves away to the *Tail of the Crank Handle*.

(iii) The surface of the curved portion is specially surface-hardened.

22. THE LOCK (66).

This comprises several parts as follows :—

(i) **The casing** (67).

(*a*) This *Casing* is cut from solid metal. The greater part of the exterior is slightly milled out, raised portions being left to form ribs along the front and top edges, flanges at the bottom, stops at the front bottom corners, and seatings for the axis pins of the tumbler and trigger and the side levers axis bush.

(*b*) On the front face of the casing there is at the top a projection which forms an *Extractor Stop* and which, in conjunction with the stop on the under-side of the front cover, limits the upward movement of the extractor.

(*c*) Near the bottom, the face is bored to permit the passage of the nose of the firing pin.

(*d*) The sides of the casing are bored to accommodate the axis bush of the side levers, the trigger axis pin and the tumbler axis pin. On the left side there are also recesses for the head of the trigger axis pin and the key on the tumbler axis pin.

(*e*) Near the top rear corner, the casing is bored to receive a rivet and distance piece by which it is strengthened and the sides correctly positioned. The upper surface is grooved to give clearance to the trigger motor push rod of the C.C. gear.

(*f*) At the bottom and on either side are two *Flanges* which ride on the guides of the side plates during the movement of the lock. In the upper flanges are rectangular slots which accommodate projections on the side levers. The lower flanges have interruptions agreeing with those in the guides on the side plates, in order that the lock may be lifted out of the gun.

(*g*) At the front end, the bottom of the casing is bored to give clearance to the movement of the head of the sear which pivots on a pin fitted across this hole.

(*h*) The interior of the casing is entirely hollowed out. Behind the top of the face is riveted a piece of metal which acts as a guide to the lock spring when the lock is being assembled, and which also forms a seating for the spring. Near the bottom are horizontal ribs which act as guide ways for the firing pin.

(ii) **The side levers** (68).

(*a*) These are two in number and together with the *Side Levers Head* are cut out of the solid, the whole forming one Y-shaped piece.

(*b*) The *Side Levers* are bored and recessed at the front to accommodate the *Side Levers Axis Bush* (69). This bush is retained in the correct position by the *Side Levers Axis Bush Split Pin* (70). On the inner side, around this hole, there is on either side a reinforced portion which serves as a bearing and a distance piece.

(*c*) Immediately behind and on the under-side of the levers are small projections which fit into slots on the lock casing.

(*d*) The side levers have arms projecting upwards and backwards from the front. At the top these arms are rounded off towards the rear, each curved portion being interrupted by a *Step* which engages with the bent on the extractor levers.

(*e*) The side lever head forms a cylindrical stem by which the lock is joined with the connecting rod. It is bored longitudinally to admit the stem of that part and at the front end it has on the inside three projections which engage with the three on the connecting rod when the lock is in position in the gun.

(iii) **The extractor levers** (71).

(*a*) These levers are two in number and take the form of plates of irregular shape. When in position they pivot on the *Tumbler Axis Pin* (72) and lie close to the outside of the lock casing, the front portion being slightly set out so as to fit over the sides of the extractor.

(*b*) The upper parts of the front ends are shaped so as to lift the extractor easily and continuously during its upward movement, while on the under-side and slightly to the rear is a straight portion which bears on the stop on the side of the lock casing, so limiting the downward movement of the extractor.

(*c*) At the rear end on the outer side is the *Bent* which is acted on by the side lever.

(*d*) At the rear lower corner the extractor levers are bored to receive the tumbler axis pin.

(*e*) The heads of both levers are slightly chamfered to clear the vertical grooves in the breech end of the barrel.

(iv) **The trigger** (73).

This consists of a rectangular bar with a boss formed near the lower end which serves as a bearing, and which is bored to receive the *Trigger Axis Pin* (74). At the lower end is the *Nose*, which bears against the *Bent on the Tumbler*, and the other end of the trigger terminates in the *Tail*, which projects out of the top of the lock casing.

(v) **The tumbler** (75).

This is curved in shape. Its *Head* is enlarged and flattened for engagement in the recess in the firing pin. The central part is enlarged and has a circular boss bored to accommodate the *Tumbler Axis Pin* (72). Immediately opposite is a *Bent* in which the nose of the trigger engages under the influence of the short arm of the lock spring. The *Tail* curves downwards to the rear.

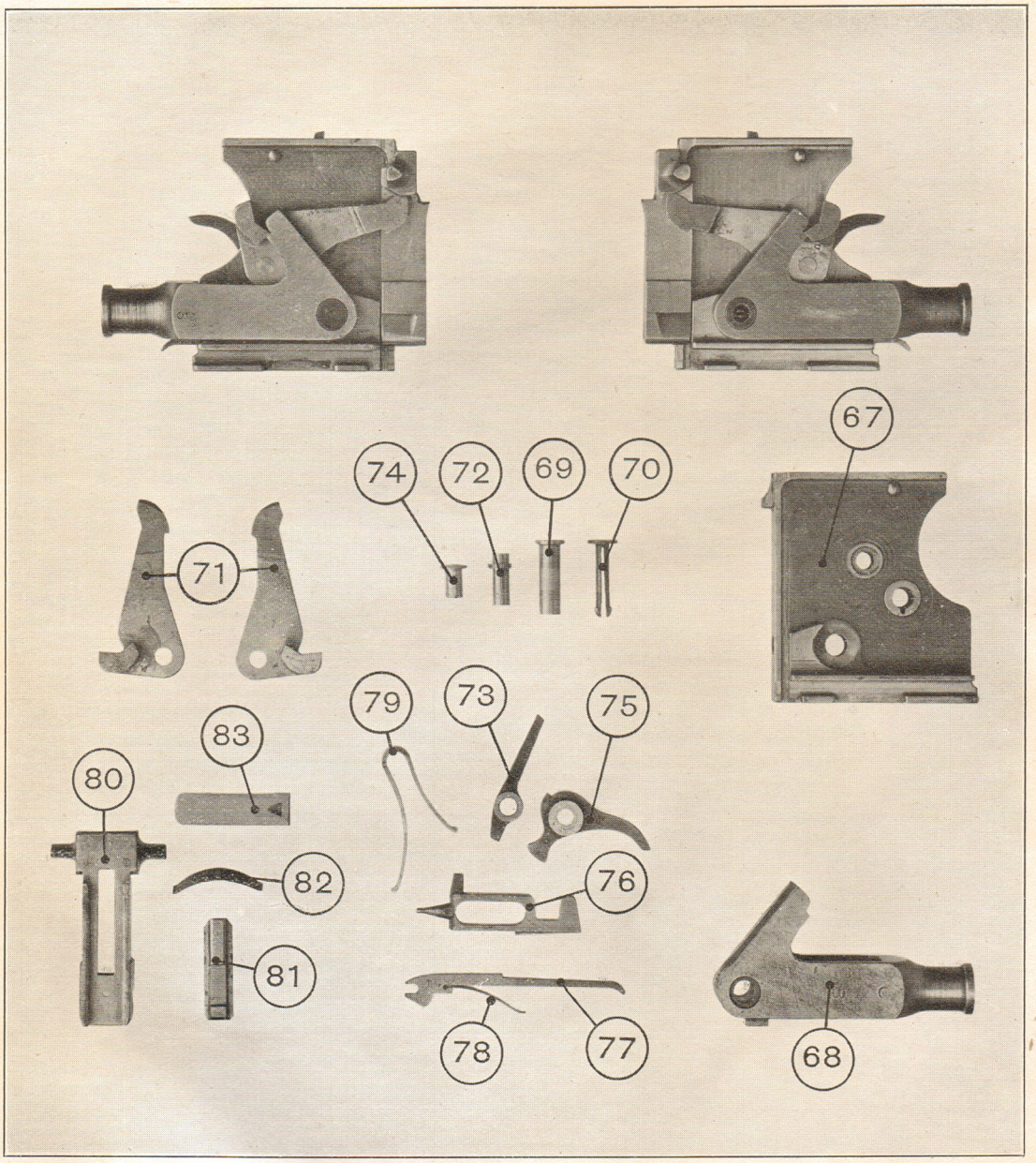
(vi) **The firing pin** (76).

This is roughly rectangular. On the upper side there is a projection at the front, against which the long arm of the lock spring bears. Protruding from the front is the tapered and straight portion which strikes the cap of the cartridge. Behind this the firing pin is cut away so that the *Side Levers Axis Bush* (69) (which runs through it) may not hinder its forward and backward movement. Towards the rear on the upper side is a *Recess* in which the head of the tumbler engages. On the under-side half way along is a *Bent*, bevelled towards the rear, which engages with a corresponding *Bent on the Sear*.

(vii) **The sear** (77).

This has an enlarged head recessed to form a *Claw* which accommodates the pin inside the front lower corner of the lock casing, by means of which the sear is correctly positioned. Behind and on the under-side is a small slot which forms a seating for the flat *Sear Spring* (78). On the upper side is a *Bent* which engages with the *Bent on the Firing Pin*. The *Tail* tapers slightly, is turned down and milled at the end.

PLATE VIII.
(Part I. Chapter 1.)



The Lock

(viii) **The lock spring** (79).

This is U-shaped. It has two arms curved and of unequal length, the shorter of which acts on the trigger while the longer one presses on the projection at the front of the firing pin. The ends of both are slightly rounded.

(ix) **The side levers axis bush** (69).

This is a small hollow cylinder with a rim at one end, this rim being accommodated in a recess in the side levers. Through the bush is passed the *Side Levers Axis Bush Split Pin* (70), which has a flat head. The outer ends are split and have shoulders to fit over a corresponding rim in the bore of the *Side Levers Axis Bush*.

(x) **The tumbler axis pin** (72).

This has, near one end, a collar bearing a key, both being accommodated in the left side of the lock casing.

(xi) **The trigger axis pin** (74).

This has a flat head received in a recess in the left side of the lock casing.

(xii) **The extractor** (80).

(*a*) On the front of this at either side are *Ribs*, the inside face of the ribs being cut away to form *Cartridge Grooves*. At the top the ribs are curved slightly, to facilitate the entry of the rim of the round into the extractor grooves.

(*b*) In the face of the extractor is a vertical slot cut to accommodate the *Gib* (81). Below this is a hole to allow the tapered portion of the firing pin to pass through.

(*c*) At the side of the extractor, near the top, are the projecting *Horns* which support it on the *Solid Cams* on the outer side plates during the backward movement of the lock. At the front, these horns are fined down to an edge so as to avoid the risk of jamming against the edge of the solid cams.

(*d*) Below the horns the extractor is cut away on either side, *Shoulders* being left for the extractor levers to bear upon when lifting it. Below these recesses are the grooves by which the side plate springs grip the extractor.

(*e*) Behind its face the extractor is for the most part cut away. At the top is a recess for the accommodation of the extractor stop on the lock frame, the bridge underneath being the stop with which the extractor stop comes into contact. Immediately below is the seating for the *Gib* (81) and *Gib Spring* (82), alongside being the grooves provided for the *Gib Spring Cover* (83). Near the bottom is the hole for the firing pin, this aperture being coned to fit the shape of the firing pin, and also slightly recessed at the top to ensure clearance by the firing pin. From the top to the bottom of the extractor are grooves which fit on to the ribs at the side of the face of the lock frame and which serve as guides for the extractor during its movement.

(xiii) **The gib** (81).

This has two projecting portions on the front, the upper projection being smaller and curved at the top, while the lower one is bevelled. The gib is retained by flanges at the side, these lying inside the extractor, while the projections protrude through the face of it. The gib is slightly curved at the back to accommodate the flat *Gib Spring* (82) by which it is held forward. The *Gib Spring Cover* (83) is a thin plate sliding in grooves and serving as a seating for the gib spring.

MECHANISM.

23. GENERAL.

The mechanical processes of the gun are rapid and complex, but in order to ensure a proper comprehension of what takes place, the complete cycle of operations—in reality almost

simultaneous—is analysed into its component parts, each of these being treated separately. In the account given below, the following conditions are assumed :—

(i) The gun has been fully loaded with live rounds which form part of a belt of cartridges.
(ii) The tail of the trigger has been tripped.

Note.—In paras. **25** and **29** describing the action of the feed block, the right hand feed block only is dealt with, the mechanical processes in the left hand feed block are similar but the direction of motion of the moving parts is changed.

24. ACTION OF RECOIL.

When the explosion of the charge takes place, the charge is converted into gases at high pressure. As a result the bullet is driven along the barrel, the gases following in their attempts to escape. Meanwhile, by direct recoil action, the recoiling portions are forced to the rear through a distance of approximately one inch (the movement of the lock and connecting rod, owing to the rotary action of the crank, is considerably greater), the fusee spring being thereby partially extended. This backward movement is assisted by the further action of the gases on the muzzle cylinder. As soon as the bullet is clear of the muzzle end of the barrel, the gases strike against the muzzle cylinder, rebounding on to the muzzle cup and assisting to force it to the rear. The gases being unable to escape until the recoiling portions have travelled about $\frac{3}{8}$ in. to the rear and the holes in the muzzle cylinder being covered by the muzzle cup, an extra impulse is given to the movement of the recoiling portions. After the $\frac{3}{8}$ in. movement, the muzzle cup uncovers the holes in the muzzle cylinder and the gases are allowed to escape.

25. FIRST ACTION OF THE FEED BLOCK.

At the moment when the explosion takes place, the top pawls are holding a round in position against the cartridge and bullet stops, while a second round is engaged by the bottom pawls. As the recoiling portions are driven to the rear, the recess in the prolongation of the left inner side plate carries back with it the stud on the bottom lever of the feed block. The bottom lever acts on the top lever, and the slide is moved over from left to right. The top pawls are thereby carried over the cartridge already held by the bottom pawls, but under the influence of the top pawls spring, the top pawls are forced down to the right of the cartridge as soon as the heads of the top pawls have passed over it.

26. BACKWARD ROTATION OF THE CRANK.

During the backward movement of the recoiling portions, the tail of the crank handle bears upon the roller and the crank is thereby rotated backwards and upwards. This rotation of the crank draws back the lock from the barrel, thus opening the breech. The fusee is turned to the rear, winding up the fusee chain and further extending the fusee spring. As the portion of the crank handle beyond the depression bears on the roller, the recoiling portions, with the exception of the lock, begin to travel forward, this movement being assisted by the tension of the fusee spring. The lock meanwhile continues its backward movement for a short distance, and then joins with the rest of the recoiling portions in their forward movement.

27. BACKWARD MOVEMENT OF THE LOCK.

When the explosion has taken place, the extractor is gripping a live round in the feed block and an empty case in the chamber. The live round is held between the upper and lower projections on the gib, while the empty case is below the lower projection covering the firing pin hole. As the lock moves to the rear, the horns of the extractor ride along the top of the solid cams and both the live round in the feed block and the empty case in the barrel are withdrawn. When the extractor reaches the end of the solid cams, it is forced down by the ramps on the rear cover. The live round is thus brought in line with the chamber, while the

empty case probably falls off through the opening for ejection. If the empty case remains on the extractor, it is removed at a later stage of the action (*see* para. 31).

28. COCKING ACTION OF THE LOCK.

As the crank rotates backwards and upwards, the connecting rod and side levers head receive an upward and rearward movement. The tail of the tumbler is lifted by the side lever head so that the tumbler itself rotates on its axis, and the head of the tumbler being engaged in the recess in the firing pin, the firing pin is forced to the rear. The lock spring, which is already under compression between the firing pin and the nose of the trigger, is further compressed and its short arm forces the nose of the trigger to pass over the bent of the tumbler, although the continued rotation of the crank affords it no opportunity to engage therein. As the upward movement of the side lever head continues, the tumbler is still further rotated and the firing pin drawn to the rear—the lock spring being more and more compressed —until the bent of the sear (the sear is forced upwards by the sear spring) engages with the bent of the firing pin. The firing pin is thus held right back and the lock is fully cocked.

29. SECOND ACTION OF THE FEED BLOCK.

As the recoiling portions go forward, the recess in the prolongation of the left inner side plate carries with it the stud on the bottom lever of the feed block. The bottom lever acts on the top lever, and the slide is moved from right to left. The top pawls are thereby carried to the left, taking with them the cartridge behind which they are engaged, and pressing it into position against the cartridge and bullet stops. The next cartridge in the belt rides, meanwhile, over the bottom pawls. The pawls are depressed, but, under the influence of the bottom pawls spring, they rise immediately behind the cartridge, thus holding it in position and preventing the belt from slipping back when the round in front is withdrawn.

30. FORWARD ROTATION OF THE CRANK.

The force of the explosion being now expended, the fusee spring takes full control of the action, and unwinds the fusee chain from the fusee. This causes a forward rotation of the crank, and imparts a forward and downward movement to the connecting rod and side levers head. These gradually straighten out, carrying the lock forward.

31. FORWARD MOVEMENT OF THE LOCK.

As the lock travels forward, the live round on the face of it is forced into the chamber and the side levers act upon the extractor levers, causing the extractor to rise. During the latter process, the upper projection of the gib rides over the base of the new round already in position in the feed block, until that round is between the two projections, the lower projection having meanwhile ridden over the base of the round in the chamber. The firing pin hole is thus brought opposite the firing pin and the cap of the cartridge in the chamber. The empty case, if it has not already fallen off the extractor, is forced off by the seating for ejection as the extractor rises. After the extractor reaches its highest position against the extractor stop, the lock travels slightly further forward until the breech is completely closed. During this last movement, the steps on the side levers engage with the bents on the extractor levers, thus holding the extractor steady. Whilst the breech is closing the side levers head presses upon the tail of the sear, which is forced down, so that the bent on the firing pin is freed from the bent on the sear; the firing pin is then carried forward under the influence of the lock spring, so that the nose of the trigger engages in the bent on the tumbler.

32. EFFECT OF C.C. GEAR TRIGGER MOTOR PUSH ROD ON THE LOCK MECHANISM.

(i) **Firing action (opening or resuming fire)**, *i.e.*, the trigger motor push rod initially tripping the tail of the trigger.

When the trigger motor push rod is pushed out of the trigger motor body into the firing slot, it acts on the tail of the trigger and forces it to the rear. By this means the nose of the trigger is disengaged from the bent of the tumbler, the firing pin thereby being freed, so that it is carried forward by the lock spring till it strikes the cap of the round in the chamber.

(ii) **Firing action (continuous fire),** *i.e.*, the trigger motor push rod tripping the tail of the trigger.

Near the completion of the forward movement of the lock, the tail of the trigger is tripped to the rear by the trigger motor push rod. The nose of the trigger is in consequence prevented from engaging in the bent of the tumbler, and when the sear is depressed, the firing pin moves forward until it strikes the cap of the live round in the chamber, thus exploding the charge.

(iii) **Cessation of fire,** *i.e.*, no tripping of the tail of the trigger by the trigger motor push rod.

The forward movement of the firing pin is interrupted by the nose of the trigger engaging with the bent on the tumbler as described in para. 31.

33. NOTES ON THE CLOSING OF THE BREECH—SAFETY DEVICES.

In accordance with usual firearm practice, mechanical safety devices are provided in the working of the gun. These are obtained as follows :—

(i) An infinitesimal period of time elapses between the closing of the breech and the explosion of the charge. This ensures that the breech is properly closed before the round in the chamber is fired (*see* para. 31). This is effected by timing the depression of the sear so that the firing pin cannot be released until the lock is in the firing position and the breech closed.

(ii) A further period of time elapses between the priming of the cartridge and the opening of the breech. This ensures that the breech is kept closed until the bullet reaches the muzzle and the pressure of the gases acting on the face of the lock is released (*see* para. 24). This provision is arranged for as follows: At the moment when the side lever head depresses the tail of the sear, the connecting rod is forced by the rotation of the crank slightly below a straight line joining the centres of the crank and the side levers axis bush. The lock is thereby drawn back a very small distance, but this movement is not sufficient to affect the closing of the breech. The shock of the explosion tends to force the connecting rod still further downwards, thus preventing an upward movement of the side lever head and a premature opening of the breech. These conditions remain unchanged until the tail of the crank handle moves back through a small distance between itself and the roller, by the end of which time the bullet has left the barrel and the gas pressure being sufficiently reduced the breech can open without danger of backflash.

(iii) In order to prevent any possibility of rebound of the crank handle on the completion of its forward and downward movement, the nose of the crank handle strikes into a recess in the check lever and rotates the check lever backwards for a short distance; as the check lever is weighted, the inertia of this weight eliminates the possibility of rebound.

34. MECHANICAL PROCESS OF LOADING WITH THE LOADING HANDLE.

(For a description of the loading handle, *see* para. 65.)

This is carried out by the firer applying pressure to the loading handle twice, each pressure thereby causing a partial rotation of the loading handle. When the loading handle is operated, it pivots on the special rear cross piece axis spindle provided. On pressure being applied to the wooden grips, the end of the cam-shaped lever (loading lever) at the front of the handle raises the knob of the crank handle, rotating the crank and withdrawing the lock until the extractor is clear of the cams and is forced down by the ramps. The central portion of the loading handle then comes into contact with the boss of the crank handle, which is thereby forced to the rear, drawing back the recoiling portions. These in turn actuate the feed block so that it carries out

its first action. The firer should then completely release the loading handle, and the fusee spring coming fully into action, carries forward the recoiling portions and effects the second action of the feed block. When the loading handle is released the crank rotates so that the lock is carried forward. This action places a live round in the feed block against the cartridge and bullet stops, with the base of this round gripped by the top portion of the extractor. Repetition of the use of the loading handle takes a live round from out of the feed block and places it in position in the breech. The term "*Half Load*" is used to describe each actual movement of the loading handle. Particular care should be taken to ensure that the loading handle is operated to its full extent both backwards and forwards, whereby the movements of the recoiling portions are fully completed. Double feeds will occur if this is not done. (*See* para. 39, Table of Immediate Action.)

35. MECHANICAL PROCESS OF UNLOADING.

This action is carried out by the firer operating the *Crank Handle* twice. When the tail of the trigger ceases to be tripped, the extractor is gripping a live round in the feed block and a live round in the chamber—assuming that the belt is not exhausted. When the crank handle is pulled back on to the roller for the first time, both cartridges are withdrawn without operation of the feed block. On the release of the crank handle, the lower live round is ejected (if it has not already fallen off), while the live round that was in the feed block is placed in the chamber. The extractor is now gripping one live round only, and by a second operation of the crank handle this is ejected in the usual manner. The term "*Clear Gun*" denotes the operation of these two movements.

IMMEDIATE ACTION.

36. DEFINITION.

Immediate action is the immediate application of a probable remedy for a stoppage, based on the position of the crank handle.

37. GENERAL REMARKS ON IMMEDIATE ACTION.

(i) The position of the crank handle will act as an indication of the immediate action that is necessary to remedy any particular stoppage. There are four positions :—

No. 1 position - - -	Crank handle right back.
No. 2 position - - -	Crank handle approximately vertical.
No. 3 position - - -	Crank handle about ·5 in. above check lever.
No. 4 position - - -	Crank handle right forward, *i.e.*, in the firing position of gun.

(ii) Immediate action must not be considered to be complete until the gun has been fired and has functioned satisfactorily.

38. EXPLANATION OF THE IMMEDIATE ACTION TABLE.

The following table of temporary stoppages (para. 39), set out in five columns, gives a clear indication of the nature and cause of each stoppage.

Column 1.—Shows the four positions of the crank handle in which the gun may stop firing. The first three positions may vary slightly. The position of the handle affords a ready indication of the correct immediate action.

Column 2.—Gives a detailed description of the immediate action to be performed by the firer.
Column 3.—Gives the result of the immediate action.
Column 4.—Gives the cause of the stoppage.
Column 5.—Gives the remedy necessary to prevent a recurrence of the fault.

39. TABLE OF IMMEDIATE ACTION.

There are two recognised methods of remedying stoppages, (i) the single-handed method, (ii) the double-handed method. In the single-handed method the pilot must always have one hand or the other on the aeroplane control lever so that only one hand is free to carry out the necessary actions. In order to render this possible some form of crank handle retaining catch is necessary to hold back the crank handle in the vertical position while the pilot is clearing the face of the lock or removing a round from the feed block. In the double-handed method the pilot may use both hands, the aeroplane control lever being meanwhile held between his knees. The table set out below gives the details of both methods. The actions marked * (. .) in columns (2) and (5) should be omitted when both hands are used.

1	2	3	4	5
Position of crank handle.	*Immediate Action.*	*Result of Immediate Action.*	*Cause.*	*Remedy.*
FIRST	Pull back crank handle on to roller. Let go. Fire.	**A.** Gun fires.	**A.** (1) Deteriorated ammunition.	**A.** (1) Annual inspections by A.I.D. inspectors.
			. (2) Tight packing in links.	(2) Compliance with "Points before firing."
		B. Gun fires, but repeats stoppage.	**B.** Excessive friction due to congealed oil.	**B.** Use electric heaters and fire occasional bursts.
SECOND	Look at the top pawls. **A. IF PROTRUDING** Press down loading handle to full extent. Depress top pawls and allow loading handle to go forward. Fire.	**A.** (1) Gun fires.	**A.** (1) Incorrect loading action, *i.e.*, Double feed.	**A.** (1) Correct loading action.
		(2) Gun fires, but repeats stoppage.	(2) Cross-feed.	(2) *See* **THIRD, C,** col. 5.
	B. IF NOT PROTRUDING. Raise rear cover. Draw back crank handle. *(Engage retaining catch.) Clear face of extractor with butt end of clearing plug. Close rear cover. Release crank handle *(from retaining catch). Half load. Fire.	**B.** (1) Gun fires.	**B.** (1) Separated case, due to insufficient support of lock on base of cartridge. The front portion of the faulty case being telescoped on to the next round.	**B.** (1) Correct gauging of length of connecting rod.
		(2) Gun repeats stoppage.	(2) Separated portion of case in chamber.	(2) Use clearing plug to remove separated case. Reload. Fire.

1	2	3	4	
Position of crank handle.	*Immediate Action.*	*Result of Immediate Action.*	*Cause.*	*Remedy.*
THIRD	Strike down crank handle. Fire.	**A.** Gun fires.	**A.** (1) Excessive friction due to congealed oil. (2) Friction on face of lock obstructing upward movement of extractor.	**A.** (1) Use electric heaters and fire short bursts occasionally. (2) High standard of armourers' training.
		B. Gun fires, but repeats stoppage.	**B.** (1) Excessive friction due to congealed oil. (2) Friction on face of lock obstructing upward movement of extractor.	**B.** (1) Use electric heaters and fire short bursts occasionally. (2) (*a*) Compliance with "Points before firing. (*b*) Change lock.
		C. Gun does not fire.	**C.** (1) Slight cross-feed. (2) Slightly misshapen link.	**C.** (1) and (2) Raise crank handle *(and engage retaining catch). Push belt into correct position in feed block *(disengage retaining catch). Strike down crank handle. Fire.
FOURTH	Half load. Fire.	**A.** Gun fires.	**A.** Missfire (defective ammunition).	**A.** Nil.
		B. Gun does not fire.	**B.** (1) Broken or damaged firing pin. (2) Broken lock spring.	**B.** (1) and (2) Unload. Change lock. Reload. Fire.

Notes.

(i) The following would cause prolonged stoppages: (*a*) Loose or broken muzzle attachment; (*b*) broken gib or gib spring; (*c*) broken fusee or fusee spring.

(ii) The following causes might bring about a run-away gun: (*a*) Broken nose of trigger; (*b*) broken bent of tumbler; (*c*) trigger motor push rod jammed (but *see* Part I, Chapter 9, C.C. gear).

In the event of either of these occurring, the gun would fire automatically, *i.e.*, would be unsynchronised from the airscrew and the C.C. gear control would become inoperative.

The remedy is to ease down the loading handle slightly. This will stop the gun from firing as the front portion of the loading handle comes into contact with the knob of the crank handle and prevents the lock from going right home. Careful manipulation of the loading handle may be used to induce a double feed, *i.e.*, stoppage 2 A.

(iii) The above table assumes that he gun has been carefully inspected before flight as laid down in para. 41 and that not more than 1,000 rounds are fired before the gun is re-inspected.

(iv) Certain stoppages occur owing to faults or faulty manipulation of the C.C. gear. Details of these stoppages are given in Part I, Chapter 9, C.C. gear.

(v) In certain types of aircraft stoppages No. 2B and 3B (2) (*b*) cannot possibly be corrected in the air, owing to the position of the gun in relation to that of the pilot. The greatest possible care should be taken therefore to prevent the occurrence of these stoppages.

(vi) Certain other types of aircraft have the gun placed in such a position that great difficulty would be experienced by the pilot in correcting these stoppages. It can be done, however, by breaking off from the air fight, and by means of loosening the safety belt, &c., the feed block and lock can be reached.

40. IMMEDIATE ACTION INVOLVING STRIPPING—SEQUENCE.

In order to remedy certain stoppages, action involving opening the gun or changing a part is necessary. Below will be found an outline of the sequence necessary for such corrective action enumerated in " Remedy " " Column 5 " of the table of immediate action (para. 39).

(i) Stoppage No. 2 B, column 5, remedy B 2. *Use of the Clearing Plug.*

(*a*) Raise the rear cover *[and engage the *Retaining Catch* (84)].
(*b*) Draw back the crank handle *[and engage the *Retaining Spring* (85)].
(*c*) Clear the face of the extractors with the butt of the clearing plug.
(*d*) Insert the clearing plug into the chamber.
(*e*) Release the crank handle, driving it down as far as possible.
(*f*) Draw back the crank handle *(and engage the retaining catch).
(*g*) Operate the handle of the clearing plug till the separated case is withdrawn.
(*h*) Release the crank handle *(disengaging the retaining catch).
(*j*) Reload and fire.

(ii) Stoppage No. 4 B, column 5. *Change lock.*

To strip :—

(*a*) Raise the rear cover (and engage the retaining catch).
(*b*) Pull back the crank handle on to the roller.
(*c*) Remove the lock from the connecting rod.

To assemble.

Reverse the above order.

41. POINTS TO BE OBSERVED BEFORE FLIGHT OR BUTT PRACTICES.

(i) See that the barrel is clean and dry.

(ii) Oil the frictional parts lightly with P. 924 oil.

(iii) Weigh the recoiling portions (for method, *see* para. 56). The gun must be in a horizontal position and the recoiling portions must not exceed two pounds in weight.

(iv) Weigh the fusee spring (for method, *see* para. 55). The tension of the fusee spring should be such as to obtain the maximum rate of fire of the gun. This tension should not exceed 12 lbs.

(v) Inspect the muzzle attachment and see that it is correctly attached and locked. The holes in the muzzle cylinder should be clear. The muzzle cup should be screwed on tightly and the buffer spring correctly positioned.

(vi) Ascertain that the locking washer is in place.

(vii) See that the gun is secure to its mounting.

(viii) Examine ammunition chutes and box to see that they are correctly fitted and clear of obstructions.

(ix) See that the link belts are correctly prepared and placed correctly in the ammunition chutes.

(x) See that the sights are properly harmonised.

(xi) Make sure that the loading handle is correctly fitted and does not hinder the movement of the crank handle.

(xii) Check all tools and spare parts in the aircraft.

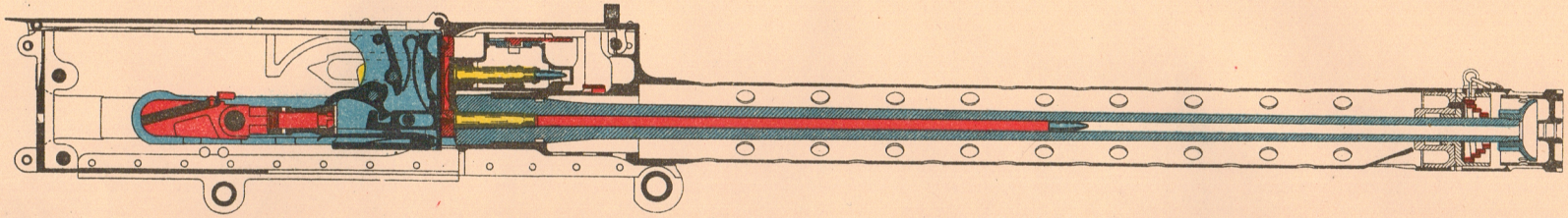
(xiii) If they are fitted, see that the catch to hold up the rear cover, and the crank handle retaining spring are in position for clearing stoppages.

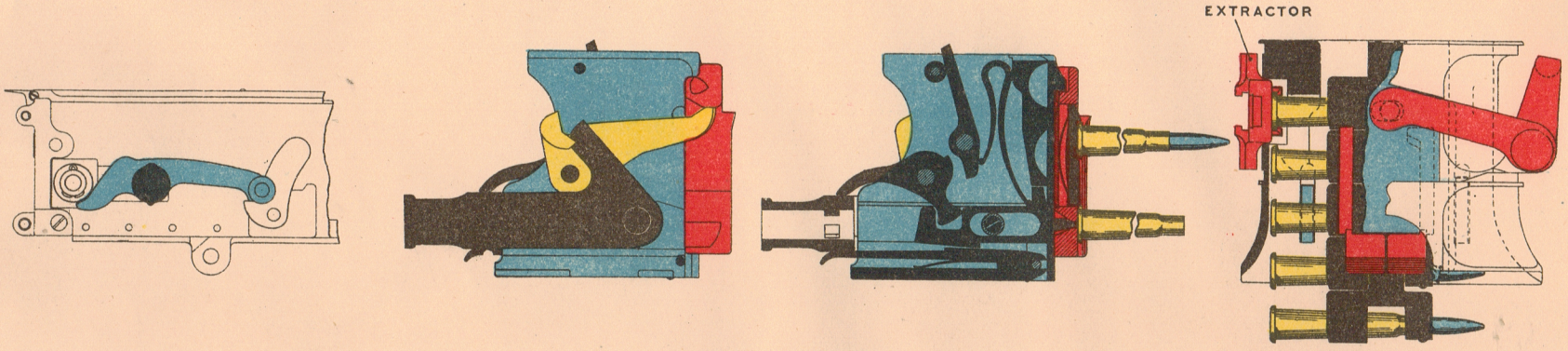
(xiv) See that the first round is engaged in front of the bottom pawls and that the end of the belt which starts with the single end of the link has been inserted into the feed block.

(xv) Test the fitting and timing of the gear.

(xvi) If facilities allow, fire a short burst on the range. As the gun is air-cooled, only short bursts can be fired : time must be allowed for the gun to cool between bursts.

GUN, VICKERS. ·303-in. AIR-COOLED. MK. II.



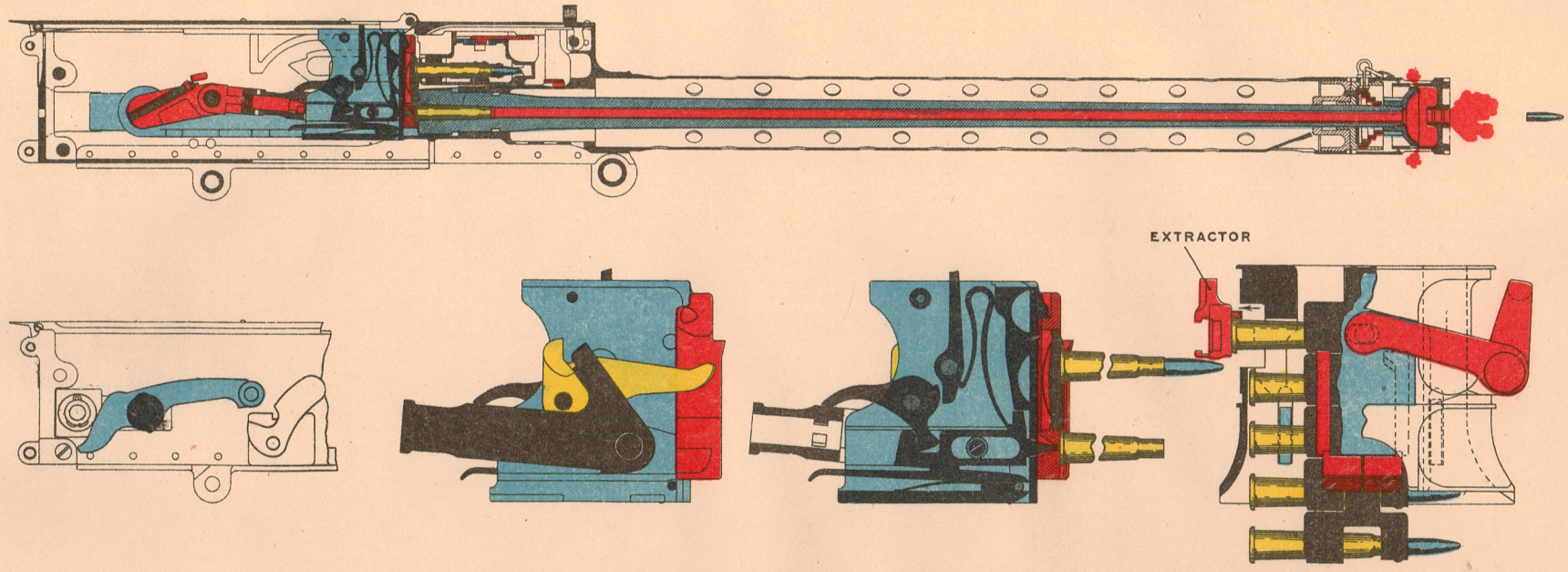


GUN FIRED.

PLATE IX.

(Part I, Chapter I.)

GUN, VICKERS. ·303-in. AIR-COOLED. MK. II.



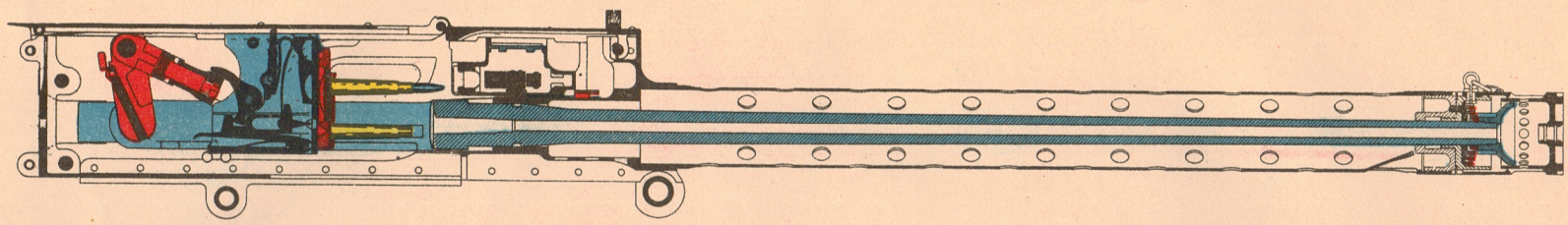
BACKWARD ROTATION OF THE CRANK.

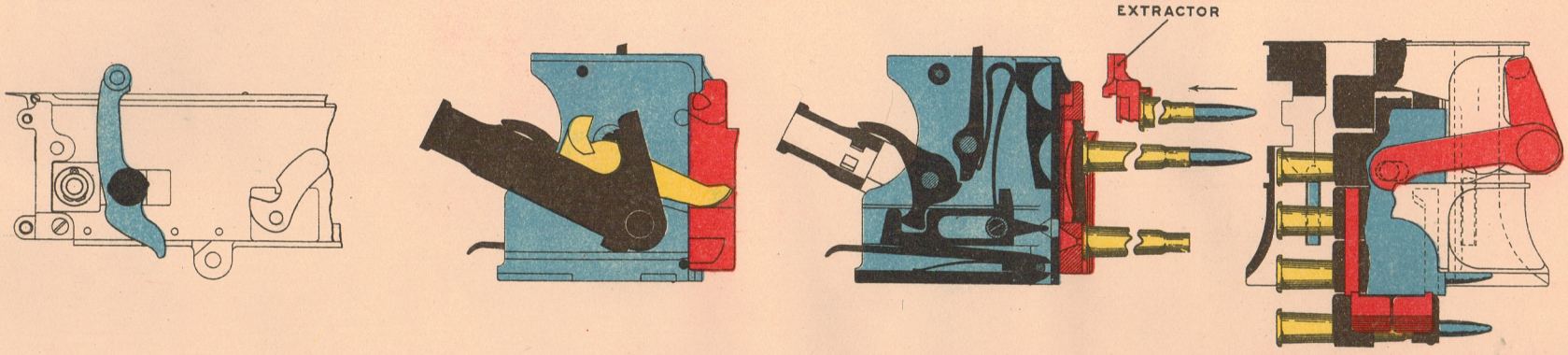
PLATE X.

(Part I, Chapter I.)

AIR COOLED MAG

GUN, VICKERS. ·303-in. AIR-COOLED. MK II.



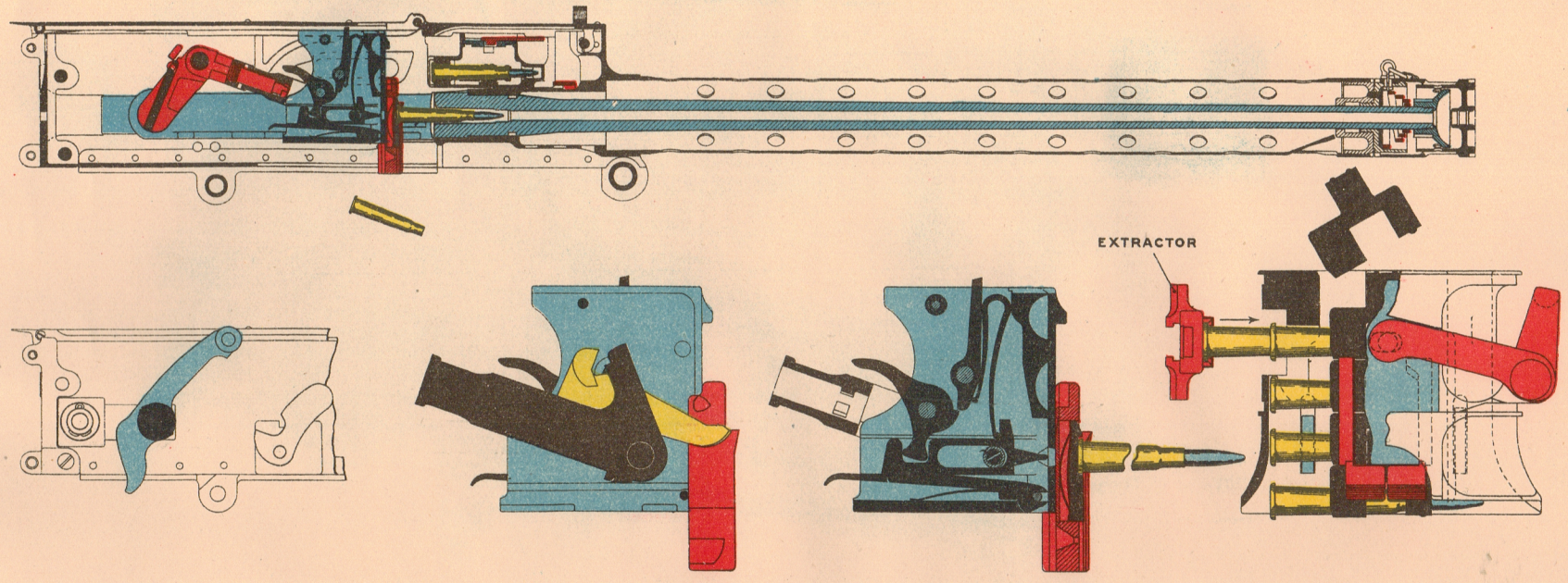


BACKWARD MOVEMENT OF THE LOCK.

PLATE XI.

(Part I, Chapter I.)

GUN, VICKERS. ·303-in. AIR-COOLED. Mk II.

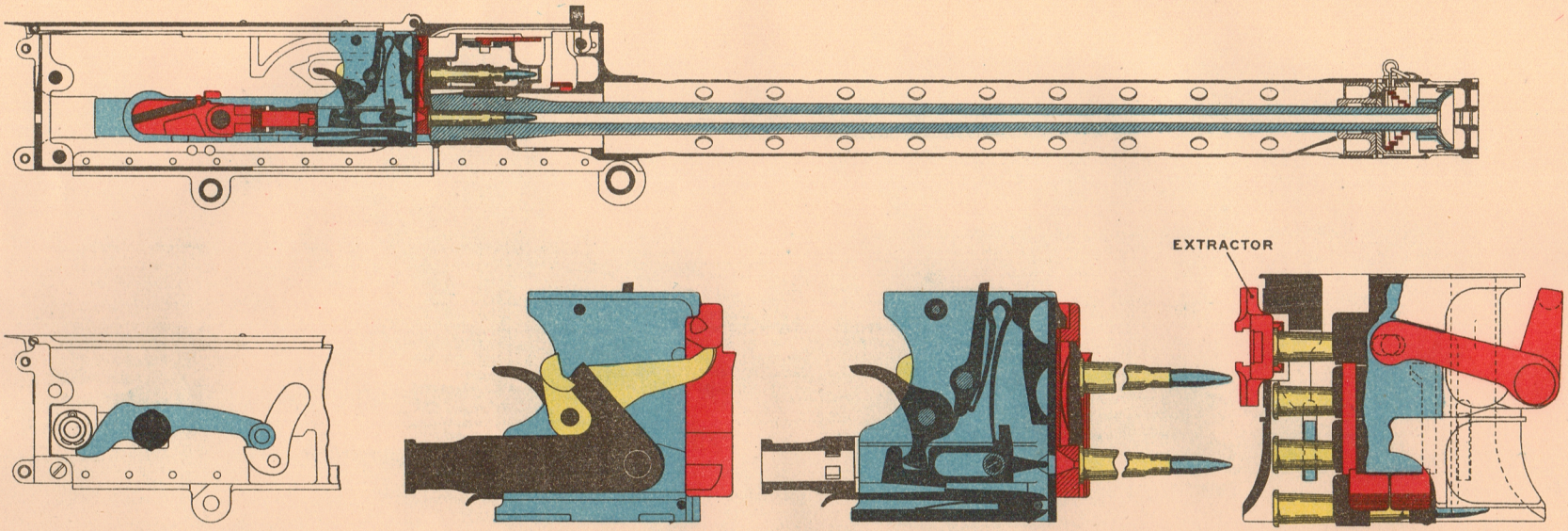


FORWARD ROTATION OF THE CRANK.

PLATE XII.

(Part I, Chapter I.)

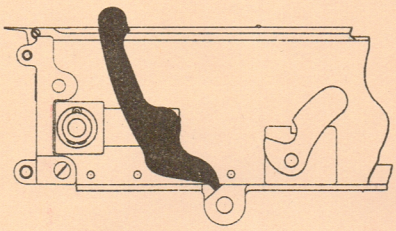
GUN, VICKERS. ·303-in. AIR-COOLED. MK. II.



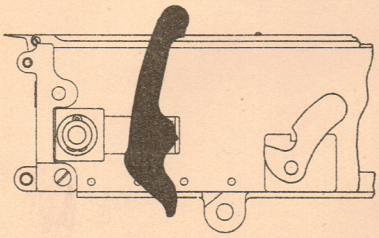
BREECH CLOSED. GUN READY TO FIRE.

PLATE XIII.

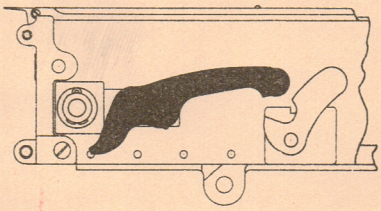
(Part I, Chapter I.)



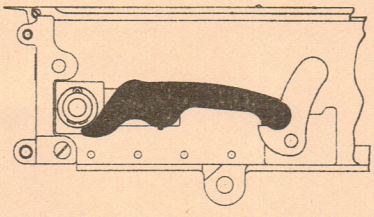
No. 1.



No. 2.



No. 3.



No. 4.

APPROXIMATE POSITION OF THE CRANK HANDLE FOR STOPPAGES.

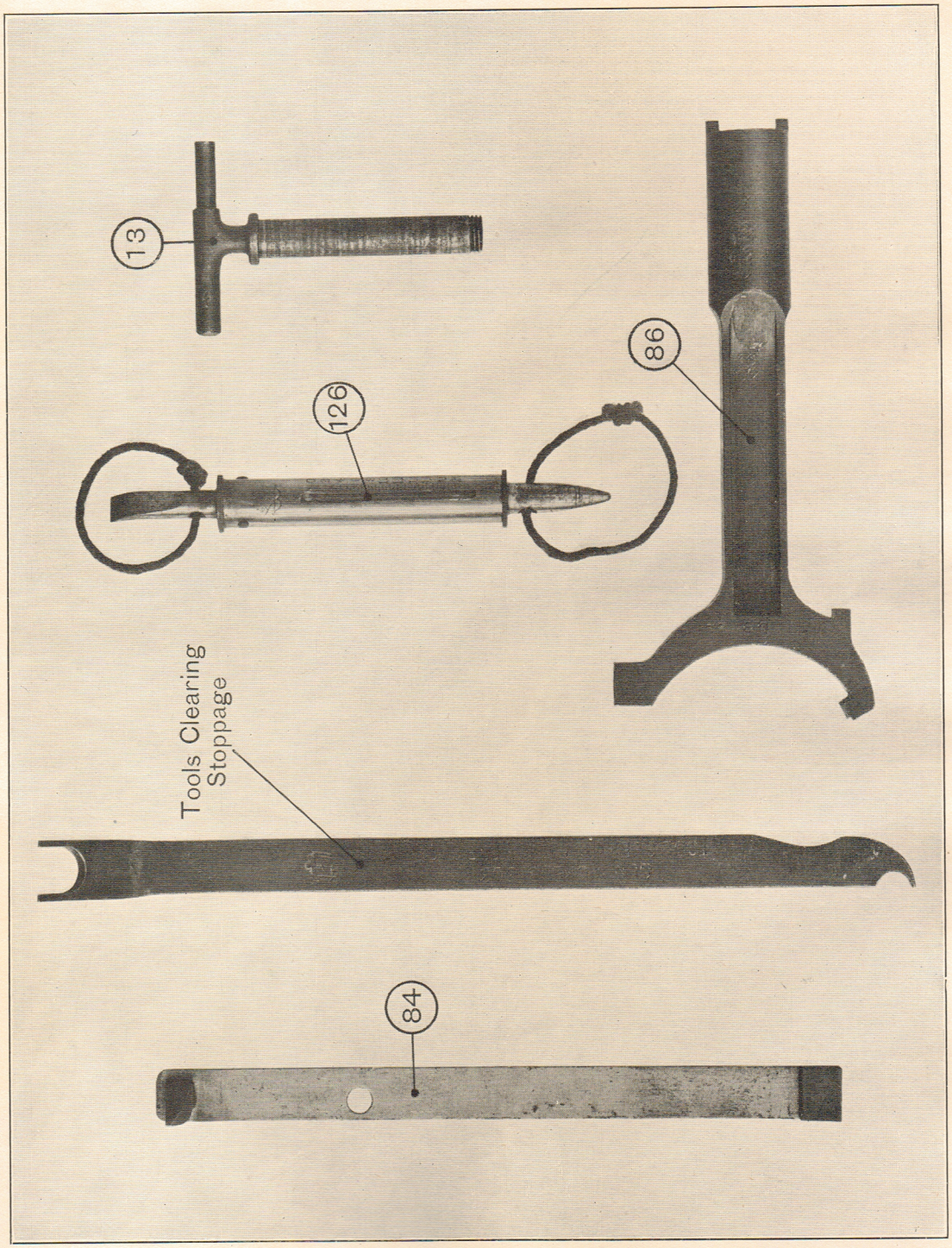
PLATE XIV.

(Part I, Chapter I.)

H.M. Stationery Office Press, Kingsway, W.C. 2.

43581/1452. Wt. 21529a. D 14552. 5500. 5/27

PLATE XV.
(Part I. Chapter 1.)



Tools used for stripping.

x 27947

(xvii) Inspect the airscrew after the firing referred to in (xvi).
(xviii) Set the rounds counter to zero, (if fitted).
(xix) See that the electric heaters (if fitted) are in working order.

42. POINTS TO BE OBSERVED DURING FLIGHT.

(i) Fire occasional short bursts to prevent the working parts becoming clogged with congealed oil.
(ii) Use the heaters for high altitudes.
(iii) The gun should be unloaded before landing.
(iv) See that the C.C. gear reservoir handle is properly positioned. (*See* Part I, Chapter 9.)

43. POINTS TO BE OBSERVED AFTER A FLIGHT OR BUTT PRACTICE.

(i) See that the gun has been correctly unloaded.
(ii) See that the tension on the lock spring has been eased (*i.e.*, lock not cocked).
(iii) Take all ammunition out of the chutes.
(iv) Examine the chutes to see that they are clear and that no burrs, &c. have formed.
(v) If possible remove the recoiling portions and take them to the armoury, where they should be thoroughly cleaned and then re-oiled.
(vi) Clean the non-recoiling portions, removing clogged oil with turpentine, then re-oil.
(vii) Examine the sights to see that they are not damaged.
(viii) If stoppages have occurred or if any defects have been apparent in the action of the gun, such defects should be noted and remedied immediately.
(ix) Fill up the history sheet (if any) of the gun.

STRIPPING.

44. GENERAL REMARKS.

(i) For completely stripping the Vickers Gun Mk. II, the following tools are required :—

(*a*) *Combination Tool* (86).
(*b*) Screwdriver.
(*c*) No. 4 punch.
(*d*) Small hammer.
(*e*) *T-fixing Pin* (13).

For preliminary cleaning [*see* para. 51(*a*)] only (*e*) is required.
(ii) When the gun is stripped, all parts should be laid out in order and so placed that they are kept clean and undamaged.
(iii) Whenever a tool is required, it is essential to use only the correct one for the particular part concerned. If this rule is not observed, screws and other parts of the gun become burred or otherwise damaged.
(iv) Before an attempt is made to withdraw the screwed axis pins, care should be taken to see that the threads are fully disengaged. (If split-pinned, the pins must be removed first).
(v) In the replacement of screwed axis pins, no force should be used. The threads will engage without unnecessary pressure. If this rule is not observed the threads (which are very fine) will become so burred that it is impossible to replace the axis pins.
(vi) When the rear cover is being raised, it should not be thrown upwards but lifted. Improper treatment may easily strain the hinge.
(vii) Before the rear cover is lowered, it is necessary to see that the lock is properly placed in the gun, and that the *Foroto* or other rear cover catch (if fitted) is clear.

(viii) Before the front cover is closed, the feed block must be in the correct position with the slide as far over to the left as it will go and vice versâ for left hand feed block. The front cover catch must be in the open position.

(ix) Whenever the lock is allowed to go forward, the trigger should be tripped to ease the lock spring. (This can be done with a screwdriver blade inserted through the firing slot.)

(x) With reasonable care, defects and breakages should be of extremely rare occurrence. They are usually due to the neglect of ordinary precaution.

45. SEQUENCE OF STRIPPING THE GUN.

(i) See that the gun is unloaded.
(ii) Disconnect C.C. gear pipe-lines and electric heaters (if fitted).
(iii) Remove the T-fixing pin.
(iv) Remove the outer casing of the muzzle attachment.
(v) Remove the muzzle cup.
(vi) Remove the feed block.
(vii) Remove the lock.
(viii) Remove the fusee anchorage and the fusee spring.
(ix) Remove the fusee.
(x) Remove the left and right slides.
(xi) Remove the barrel and inner side plates.

46. DETAILS OF STRIPPING THE GUN.

(i)—(*a*) Withdraw the split pin securing the outer casing of the muzzle attachment to the gland.
(*b*) Give the outer casing one-sixth of a turn.
(*c*) Draw off the outer casing.

(ii)—Unscrew the T-fixing pin three complete turns. Remove the T-fixing pin.

(iii)—(*a*) Unscrew and remove the muzzle cup, using the combination tool.
(*b*) Withdraw the buffer spring.
(*c*) Withdraw the locking washer with the threaded portion of the T-fixing pin screwed into the hole provided.
(*d*) Unscrew and remove the gland, using the combination tool.

(iv)—(*a*) Lift up the front cover catch.
(*b*) Raise the front cover.
(*c*) Take out the feed block.

(v)—(*a*) Pull back the crank handle on to the roller.
(*b*) Raise the rear cover (the front cover will close when the rear cover is opened).
(*c*) Grasp the lock, holding the extractor down at its lowest point by means of the forefinger.
(*d*) Ease the crank handle slowly forward till the lock is released from the side plates.
(*e*) Lift the lock clear of the breech casing.
(*f*) Give the lock one-sixth of a turn.
(*g*) Remove the lock from the connecting rod.
(*h*) Let the crank handle go right forward, keeping the left thumb on the milled portion of the connecting rod in order to prevent the latter from turning back under the crank.

(vi)—(*a*) Grasp the fusee spring box with the left hand and push it forward until it is clear of the positioning studs.
(*b*) Disconnect the fusee spring from the fusee chain, avoiding side strain.

(vii)—(*a*) Turn the fusee to the rear, till the lugs on its axis pin are free to be withdrawn.
(*b*) Pull out the fusee.

(viii)—Pull back the actuating rod of the rounds counter (if fitted).

(ix)—Lower the rear crosspiece.

(x)—Pull out the right and left slides.

(xi)—(*a*) Draw out the recoiling portions by means of the crank handle and the connecting rod.
(*b*) Release the actuating rod of the rounds counter (if fitted).
(*c*) Separate the inner side plates from the barrel.

47. DETAILS OF RE-ASSEMBLING THE GUN.

(i)—(*a*) Place the barrel partially in position in the casing, leaving the barrel block clear of the rear crosspiece opening, bullet guide uppermost.
(*b*) Pull back the actuating rod of the rounds counter (if fitted).
(*c*) Replace the left inner side plate on the barrel trunnion.
(*d*) Replace the left hand extension of the crank in the rear end of the left inner side plate, and the front end of the right inner side plate to the barrel trunnion.
(*e*) Slide the recoiling portions forward into position by means of the crank handle and connecting rod.
(*f*) Leave the crank handle in the forward position.
(*g*) Release the actuating rod of the rounds counter (if fitted).

(ii)—Replace the right and left slides.

(iii)—Raise the rear crosspiece, taking care that the actuating rod of the rounds counter (if fitted) is not strained.

(iv)—Replace the fusee, keeping the chain uppermost. See that the fusee is fully home and turn the fusee chain forward over the top of it.

(v)—(*a*) Connect the fusee spring with the fusee chain, taking care not to pull the fusee out of position.
(*b*) Replace the fusee spring box which forms the fusee anchorage, making sure that the claws are in line with all three studs before releasing the pressure.

(vi)—(*a*) Pull back the crank handle and raise the connecting rod by pressure of the right thumb on the milled portion.
(*b*) Replace the lock on the connecting rod, holding down the extractor. See that the lock is cocked.
(*c*) Give the lock one-sixth of a turn to bring it to the vertical.
(*d*) Lower the lock into the breech casing, making sure that it is properly in position in the guides.
(*e*) Test the position of the lock with the palm of the left hand.
(*f*) Lower the rear cover.
(*g*) Allow the crank handle to go right forward.
(*h*) Ease the lock spring.

(vii)—(*a*) Raise the front cover.
(*b*) Replace the feed block, pressing the slide over to the left as far as it will go, (when replacing the left hand feed block the slide must be over to the right), making sure that the stud on the lower lever is engaged in the recess in the prolongation of the left inner side plate.
(*c*) Lower the front cover.
(*d*) Lower the front cover catch.

(viii)—(*a*) Replace the gland, using the combination tool.
(*b*) Replace the locking washer.
(*c*) Remove the T-fixing pin.
(*d*) Replace the buffer spring so that the free end of the large diameter coil is just clear of one of the lower holes for the split pin in the gland.

(*e*) Screw on the muzzle cup.
(*f*) Tighten up the muzzle cup with the combination tool, taking care not to damage the threads by excessive force.

(ix)—(*a*) Replace the outer casing of the muzzle attachment, so that the safety chain is on the lower side.
(*b*) Replace the split pin in the hole which is just clear of the free end of the large coil of the buffer spring. This is the only hole in which the split pin can be fully inserted.

(x)—Replace the T-fixing pin.

48. DETAILS OF STRIPPING THE COMPONENT PARTS.

(i) **The lock.—**

(*a*) *To strip :—*
The only tool required for stripping this part is the T-fixing pin.

(1) See that the lock is fully cocked.
(2) Force out the side lever axis bush split pin.
(3) Take out the side lever axis bush.
(4) Slide off the side levers and side lever head.
(5) Remove the extractor levers.
(6) Take off the extractor.
(7) Force out the tumbler axis pin.
(8) Take out the tumbler.
(9) Release the lock spring by depressing the sear.
(10) Force out the trigger axis pin.
(11) Take out the trigger.
(12) Take out the lock spring.
(13) Depress the sear and allow the firing pin to slide out.
(14) Move the sear 45 degrees and allow it to slide out.

(*b*) *To reassemble :—*
Reverse the above, except for the lock spring, which must be forced home (with the long arm towards the extractor) when the other parts are assembled and the lock is in the fired position.

Notes.—(1) The three axes go in from left to right.
(2) The firing pin must be in the rear position.
(3) The head of the tumbler must engage with the recess in the firing pin.
(4) The firing pin should never be released unless the extractor is up against the extractor stop.

(ii) **The extractor.**

(*a*) *To strip :—*
(1) Push out the gib spring cover.
(2) Remove the gib and spring.

(*b*) *To reassemble,* reverse the above procedure.

(iii) **The feed block (right hand).**

(*a*) *To strip :—*
(1) Force out the lever split pin.
(2) Separate the top and bottom levers, using, if necessary, the thicker arm of the T-fixing pin.
(3) Take out the slide.
(4) Remove the top pawls and spring.
(5) Draw out the bottom pawls axis pin.
(6) Remove the bottom pawls and spring.

(*b*) *To reassemble* the feed block, reverse the above procedure.

(iv) **The feed block (left hand).**

(*a*) *To strip* :—

(1) Force out the lever split pin.
(2) Separate the top lever cam from the bottom lever.
(3) Remove the top slide lever.
(4) Take out the slide.
(5) Remove the top pawls and spring.
(6) Unscrew the retaining pawls screwed axis pins.
(7) Remove the retaining pawls and spring.

(*b*) *To reassemble*, reverse the above.

(v) **The front and rear covers.**

(*a*) *To strip* :—

(1) Remove the keeper pin and check nut.
(2) Force out the joint cover pin.

(*b*) *To reassemble*, reverse the above procedure.

(vi) **The front cover catch.**

(*a*) *To strip* :—

To remove the spring and plunger, force the plug inwards and give a quarter turn by means of a screwdriver, when the plug will be forced out by the spring. Before the plunger is removed, it must be turned so that the slots are free to pass the lugs in the catch. If necessary, by taking out the keeper pin, the catch may be removed from the gun.

(*b*) *To reassemble*, reverse the above procedure.

(vii) **The rear cover lock.**

(*a*) *To strip* :—

(1) Unscrew and take out the axis pin.
(2) Remove the cover lock and spring.

(*b*) *To reassemble*, reverse the above procedure.

(viii) **The muzzle attachment outer casing.**

(*a*) *To strip* :—

Using the combination tool unscrew the muzzle cylinder from the muzzle attachment outer casing.

(*b*) *To reassemble*, reverse the above procedure.

CARE AND CLEANING.

49. IMPORTANCE.

The greatest attention should be given to care and cleaning, in order that the gun may fulfil to the utmost of its power the task demanded of it from a mechanical point of view, and in order to obtain the maximum results when in action.

50. GENERAL POINTS.

(i) Avoid damage to the gun through careless handling.

(ii) Never play with the crank handle unless the lock is in the gun. The reason for this is that the interrupted flange on the connecting rod is liable to be damaged and also dents may be made in the bottom plate.

(iii) Never keep the lock spring compressed unnecessarily, *i.e.*, lock cocked.

(iv) The browning on the barrel and gun must be preserved as it is a protection against rust.

(v) The buffer spring and muzzle cylinder tend to foul after about 600 rounds. No oil should therefore be put on them and they should be very carefully examined after each flight.

(vi) The top pawls must be set down the right amount in order to avoid failures in feed. The correct amount may be measured by inserting the body of the T-fixing pin through the opening on the right side of the feed block. The lower edge of the feed pawls should just touch the T-fixing pin.

(vii) Fusee springs are made of special wire and are liable to fail after prolonged use. They should be tested regularly to ensure that they are satisfactory.

(viii) For instructions regarding the " Care and Cleaning of Barrels," *see* Part I, Chapter 8.

51. CLEANING OF GUNS.

(i) General.

The amount of cleaning that a gun requires depends upon the frequency with which it is used. Guns can be grouped therefore under the following headings, and cleaning should be carried out according to the instructions given for the particular group concerned.

(*a*) Guns fired daily or at frequent intervals.
(*b*) Guns kept in a unit armoury or store as equipment available for use at short notice.
(*c*) Guns stored and treated with mineral jelly.

(ii) Guns fired daily or at frequent intervals.

(*a*) *Preliminary cleaning.*—As soon as is practicable after firing, the gun must be thoroughly cleaned. The parts that require immediate attention as as follows :—

The barrel.
The lock.
The muzzle attachment.
The muzzle cup.
The buffer spring.

The barrel should be cleaned out with well-oiled 4 in. × 2 in. flannelette. (For further instructions, *see* Part I, Chapter 8.) The lock should be stripped, cleaned and well oiled. All traces of carbon should be cleaned off the muzzle attachment, muzzle cup and buffer spring. No oil should be put on any part of these three items.

(*b*) *Principal and second cleaning.*—This cleaning must be carried out as soon as possible after the preliminary cleaning and should include the complete cleaning of the parts enumerated in (*a*) above with the following additions :—

The locking washer.
The muzzle gland.
The feed block.
The inner side plates, the connecting rod and crank.
The left and right slides.
The fusee spring, fusee and box.
The front and rear covers.
The rear crosspiece.

The outside of the barrel casing.
The outside and inside of the breech casing.

To enable the cleaning of the above parts to be carried out, it is necessary to undo the C.C. gear trigger motor union nut and the front and rear mounting bolts, and remove the gun from the aeroplane.

As many of the above parts as possible should be cleaned, but if the cleaning necessitates the removal of the gun and such removal is undesirable for service reasons, the gun should be left in position on the aeroplane.

(*c*) *Third and subsequent cleanings.*—For a period of ten days after firing, the following parts should be cleaned and oiled thoroughly each day :—

The barrel.
The complete muzzle attachment.
The lock.
The feed block.

This is necessary owing to the exudation and condensation that occurs in these parts, caused by the chemical action of the gases from the cartridge.

(iii) **Guns kept in unit armoury or store as equipment available for use at short notice.**

Guns included in the above category should be stored covered up in racks or in gun chests. They should be kept in a horizontal position and all parts covered, both internally and externally, with a thin film of lubricating oil. The type of oil to be used must depend upon the climatic conditions. In normal circumstances the barrel and lock and the other parts enumerated in para. 51 (ii) (*a*) should be stripped, cleaned and re-oiled weekly.

(iv) **Guns stored and treated with mineral jelly.**

(*a*) The above description applies to guns retained at stores depôts, &c., and in store at units or stations when not required for use at short notice. They should be kept in *Chests or Cases* (87) of approved pattern, such chests or cases being kept in a dry condition with the felt linings greased as necessary with mineral jelly. Unpainted steel surfaces should be coated thinly with mineral jelly, after having been cleaned. Insides of barrels should be kept well greased with a mixture of 95 per cent *Mineral Jelly* (88) and 5 per cent *Beeswax* (89) applied hot. Locks should be removed, cleaned and soaked in hot mineral jelly and stored, in metal trays or boxes, separately from the guns and safeguarded under lock and key.

(*b*) The fusee springs must have the tension slackened.

(*c*) These guns should be stripped, cleaned, examined and re-greased once in every six months, a note to this effect being made on the label attached to the gun. For full storage instructions, *see* Air Publication 830, Part II.

52. LUBRICATION OF THE GUN.

Owing to the low temperatures prevailing at high altitudes, there is a constant risk of the working parts becoming jammed by congealed oil. The gun, therefore, must be oiled very sparingly. The oil to be used is known as P. 924 (90). This oil should be applied with a camel hair brush. The following parts require special care in their lubrication :—

(i) The lock, generally.
(ii) The inner side plates.
(iii) The feed block, generally.
(iv) The fusee chain.

EXAMINATION OF THE GUN

53. GENERAL REMARKS.

It is most important that not only should machine guns be examined when first taken over, but frequent examination of guns and mountings should be carried out by the Officer in Charge of Armament.

The following detailed examination should be carried out periodically.

54. PERIODICAL EXAMINATION OF GUN.

(i) **Muzzle attachment outer casing.**

Examine for play on the gland, wear of the split pin, cleanness of the muzzle cylinder and absence of hard fouling.

(ii) **Muzzle cup.**

Examine for rust, burring or damage to the thread and signs of cracks or flaws.

(iii) **Buffer springs.**

The correct height is ·78 in. If this becomes less than ·72 in. a new buffer spring should be brought into use. It is possible that this loss of height will occur after 2,000 rounds have been fired.

(iv) **Rear cover lock.**

The rear cover should fasten automatically when lowered. The cover lock axis pin should be fully screwed home.

(v) **Fusee spring and fusee.**

See that the hooks of the spring are in good condition. The threads of the adjusting screw must be in good order. Note that the vice pin is not bent. Test the weight (*see* para. 55). See that the fusee and chain are in good condition.

(vi) **Recoiling portions.**

Remove the fusee spring and work the recoiling positions backwards and forwards. If they move freely they are correct. Test the weight (*see* para. 56). If they are stiff, look for the following points :—

(*a*) Front packing too tight.
(*b*) Dented side of breech casing and consequent excessive friction between the inner side plates and the breech casing.
(*c*) Slightly bent or damaged inner side plates.

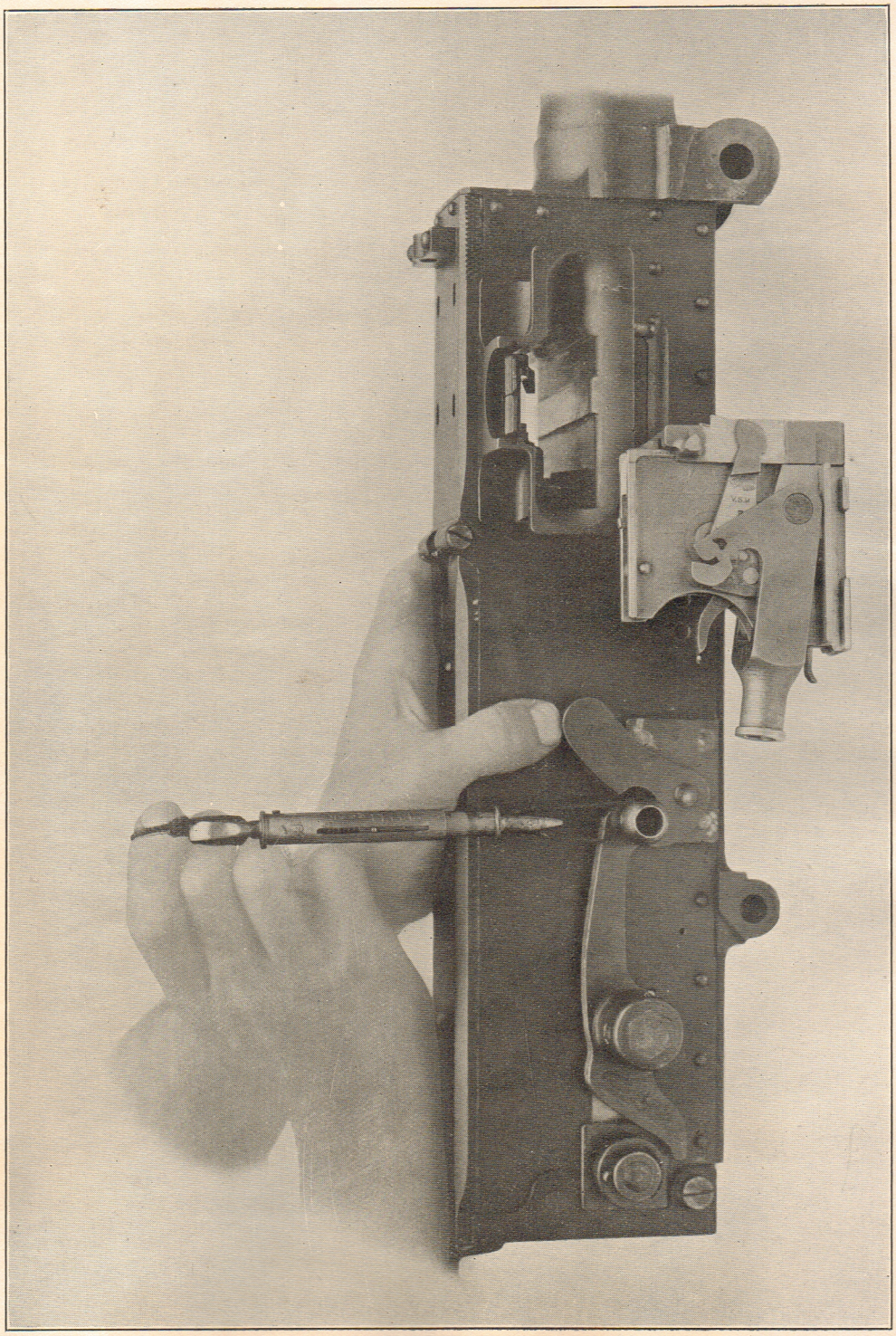
(vii) **The lock.**

(*a*) *Side and extractor levers.*

(1) Remove the feed block and keep the front cover raised.
(2) Draw back the crank handle and let it go slowly forward on to the check lever.
(3) If correct there should be no vertical play, when the extractor is manipulated by hand, after the lock is home.

(*b*) *Bents of sear and firing pin.*

(1) Pull the crank handle on to the roller.
(2) Release the trigger.
(3) The extractor should be at its highest point before the sear releases the firing pin.



Weighing the Fusee Spring.

(c) *Extractor.*

(1) Remove the lock.
(2) Examine the face of the extractor for burrs or flaws.
(3) Try the grooves with an armourer's dummy to see if the cartridge is held horizontally.
(4) Test the gib and spring.

(d) *Nose of trigger and bent of tumbler.*

(1) Fully cock the lock.
(2) Release the sear; the firing pin should be held back.

(e) *Firing pin.*

See that the point is not broken. A broken firing pin can be recognised, without stripping the lock, by releasing the lock spring with the extractor up. If correct the firing pin will protrude through the firing pin hole and can be withdrawn by raising the tail of the tumbler. If it does not protrude or if protruding its point is not withdrawn when the tail of the tumbler is raised, some part of the firing pin is broken. This test must be done with the extractor in the vertical position.

(f) *Lock spring. Test the weight as follows :—*

(1) Fully cock the lock.
(2) Place the bottom of the lock on a flat surface.
(3) Place the loop of a *spring balance* (126) over the side lever head and the left hand on top of the lock.
(4) Draw the side lever head upwards with the spring balance; when the tumbler commences to move the spring should record 14 lbs.

(viii) **Barrels.**

See Section on " Care of Barrels, Part I, Chapter 8," for all information on care, cleaning and maintenance.

(ix) **Axis pins, &c.**

See that all axis pins are correct.

REPAIRS AND ADJUSTMENTS.

55. INSTRUCTIONS FOR WEIGHING AND ADJUSTING THE FUSEE SPRING.

(i) Take out the lock.
(ii) Place the loop of the *spring balance* (126) over the knob of the crank handle.
(iii) Standing on the left side of the gun, press down the check lever with the left hand.
(iv) Pull the balance vertically upwards, resting the wrist on the breech casing.
(v) The reading, indicated when the crank handle commences to move, will be the tension of the fusee spring.
(vi) The tension of the fusee spring should be such as to obtain the maximum fire efficiency of the gun. The tension should not exceed 12 lbs.
(vii) If the spring is over or not up to its correct weight, adjust it by means of the vice pin. Generally six clicks (three revolutions) make a difference of about 1 lb. Turning the vice pin clockwise decreases the weight and *vice versâ*.

56. INSTRUCTIONS FOR WEIGHING THE RECOILING PORTIONS.

(i) Remove the buffer spring.
(ii) Remove the fusee spring.
(iii) Place the crank handle nearly vertical.
(iv) Place the loop of a *spring balance* (126) over the boss of the crank handle and pull slowly to the rear.
(v) The tension should not exceed 2 lbs.

57. INSTRUCTIONS FOR TESTING THE LENGTH OF THE CONNECTING ROD.

(i) Remove the fusee spring.
(ii) Raise the rear cover and pull the crank handle on to the roller.
(iii) Insert on the face of the extractor, opposite to the firing pin hole, an armourer's dummy.
(iv) Lift the extractor up to its highest point.
(v) See that the barrel is fully forward (the fusee spring being off, the barrel is not necessarily right forward).
(vi) Turn the crank handle towards the check lever.
(vii) Guide the armourer's dummy into the chamber.
(viii) Push the check lever back just clear of the crank handle, and let the crank handle gently down towards it.
(ix) If the connecting rod is of correct length, a check will be felt just before the crank handle reaches the check lever. If no check is felt, the lock is not fully home (*i.e.*, the connecting rod is too short).

58. INSTRUCTIONS FOR ADJUSTING THE LENGTH OF THE CONNECTING ROD.

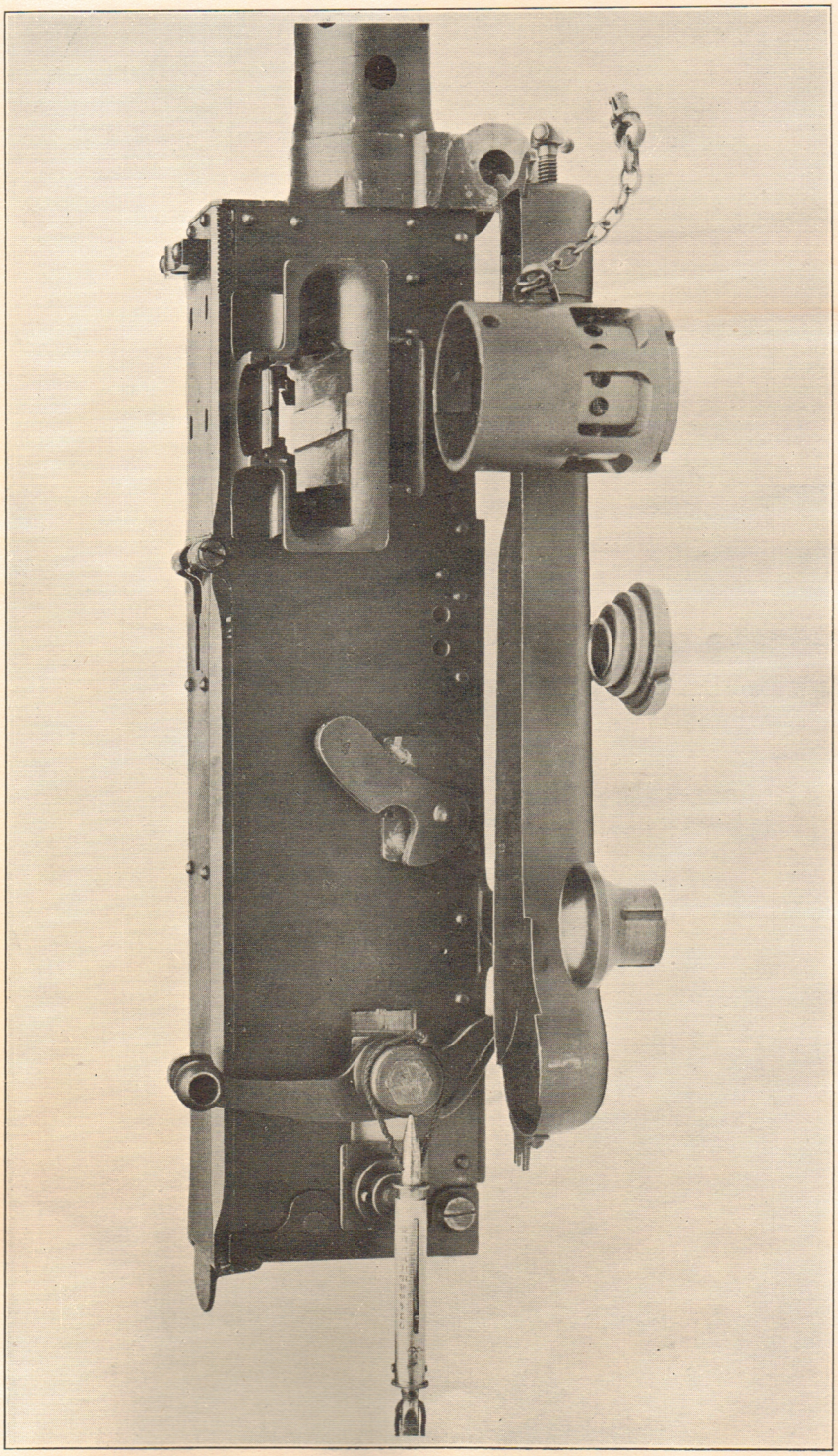
(i) Remove the fusee spring.
(ii) Take out the lock.
(iii) Determine the number of No. 1 or of No. 2 washers (or both) required to correct the length of the connecting rod, by first placing a No. 1 on the outer face of the adjusting nut on the connecting rod, replacing the lock and re-testing the length, adding washers and again re-testing as may be necessary. When the correct length has been determined, the washers which have been placed on the outer face of the adjusting nut must be assembled permanently on the shoulder of the connecting rod and secured by the nut. To do this, turn the connecting rod back, unscrew the adjusting nut with the combination tool and remove it. Place the washers on the connecting rod and screw the adjusting nut tightly home on to the washers. Re-test to ensure that the adjustment is correct.

Note.—Two sizes of washers, ·003 and ·005 in. are issued to enable this fine adjustment to be made. The No. 1, ·003 in., washer has one hole punched in the rim and the No. 2, ·005 in., washer has two holes in the rim. By the use of these sizes in combination, adjustments to 3, 5, 6, 8, 9 and 10 thousandths of an inch can be made. There is no mechanical reason or necessity to use both washers, unless only a combination of the two produces the required length.

59. INSTRUCTIONS FOR THE RENEWAL OF THE FRONT PACKING.

(i) Remove the muzzle attachment outer casing.
(ii) Unscrew the muzzle cup.
(iii) Remove the locking washer.
(iv) Unscrew the gland and re-pack (if necessary) or replace the asbestos yarn, having first oiled it, by winding it loosely round the barrel; whilst winding, push it in with a punch or a piece of wood.
(v) Screw on the gland as tightly as possible by hand.
(vi) Hang the lock, *i.e.*, place the lock so that the horns of the extractor are engaged in the steps on the solid cams.

PLATE XVII.
(Part I. Chapter 1.)



Weighing the Recoiling Portions.

x 27947

(vii) Work the recoiling portions backwards and forwards to ensure that they move freely.

(viii) If the packing is found to bear too hard on the barrel, the gland should be removed and one or two strands of the asbestos yarn taken out.

(ix) Screw the gland up tightly with the combination tool.

(x) Replace the locking washer, muzzle cup and muzzle attachment.

(xi) Test the weight of the recoiling portions (*see* para. 56).

60. INSTRUCTIONS FOR VARIOUS REPAIRS TO THE LOCK.

The lock should be stripped [*see* para. 48 (i)] until the faulty part is reached, when it should be replaced and the lock assembled as detailed. Care should be taken that the new part is satisfactory because, although all parts are made to gauge, small individual differences are certain to occur; it is therefore always advisable to try several different samples of the same part before considering that the repair is satisfactory.

61. SPARE PARTS AND TOOLS.

No spare parts or tools of any sort are issued with the gun. It is necessary to demand these items separately according to the establishment given in the equipment table for the type of aeroplane with which the squadron or unit is equipped. The manner of storing these items is laid down in Air Publication 830, Part II.

62. SPARE PARTS AND TOOLS THAT SHOULD BE TAKEN INTO THE AIR.

The following spare parts and tools should be taken into the air.

(i) Spare lock.
(ii) Mallet (for clearing No. 3 stoppages).
(iii) *Foroto* jam clearer.
(iv) Clearing tool.

Special clips have been devised to take the lock and mallet.

63. THE ROUNDS COUNTER AND MECHANISM (91).

The rounds counter is a " veeder " apparatus, the principle of which is similar to that of the ordinary cyclometer. It consists of the following parts :—

(i) **The counting mechanism** is enclosed in a small rectangular box. To the front face of this box is fastened a flange through which two holes are bored at the top and bottom. In the rear face of the box is a glass covered opening through which the figures registered by the counting mechanism may be read. To the right of the box is a projection, bored to accommodate a shaft connected to the internal mechanism. To the end of this shaft is fastened a toothed wheel having eleven teeth which occupy two thirds of its circumference, the remaining portion being cut away to accommodate a small set screw. On the left of the box is another projection bored to accommodate another shaft connected with the internal mechanism. On the end of this shaft is fastened a milled nut.

(ii) **The fixing block** is a bridge-shaped steel block, by means of which the counting mechanism box is attached to the rear cross piece of the gun. From front to rear at its corners are drilled four holes to accommodate the screws which attach it to the rear cross piece. There are also two smaller holes by which the flange at the front of the counting mechanism box is attached to this block.

(iii) **The cylindrical box** is threaded externally at the rear to accommodate a hexagonal nut. In front of the threaded portion of the box is a triangular flange with three holes for the screws which attach it to the rear cross piece of the gun. The front face of the cylindrical box is solid, except for a square opening.

(iv) **The hexagonal nut** is threaded internally to fit the rear of the cylindrical box and is pierced centrally to admit the rear end of the reciprocating spindle.

(v) **The reciprocating spindle** is made to work in the cylindrical box and is of sufficient length to protrude at both ends. At the front it has a square portion, behind which is a collar that limits its forward movement and acts as a seating for the actuating spring. Beyond this the collar is circular and of such a diameter as to act as a bearing for the spring. Behind this the spindle is smaller in diameter and has fourteen teeth made to engage with those in the toothed wheel on the right side of the counting mechanism box.

(vi) **The actuating spring** is a spiral spring which fits over the centre portion of the reciprocating spindle, and is enclosed in the cylindrical box. It is always under compression between the collar on the spindle and the hexagonal nut at the rear of the cylindrical box.

(vii) **The operating angle bracket** is a small steel bracket attached by two rivets to the extension of the right inner side plate.

(viii) **Action of the rounds counting mechanism.**

The counter is arranged to register during the forward movement of the recoiling portions of the gun. When the gun is fired, the recoiling portions are driven to the rear, carrying with them the operating angle bracket which pushes back the reciprocating spindle. The actuating spring inside the cylindrical box is thus compressed and the toothed wheel on the right side of the counting mechanism box is rotated, although the rotation of the wheel during this part of the action does not affect the counting mechanism. Immediately the recoiling portions of the gun go forward, the reciprocating spindle is carried forward by the actuating spring inside the cylindrical box, and the toothed wheel on the right side of the counting mechanism box is rotated in the opposite direction. As a result of this rotation the number already shown on the dial on the counting mechanism box is increased by one. It will be seen that the counter registers during the forward movement of the recoiling portions, so that the registration is affected by the action of the actuating spring. If the counter were arranged to register during the backward movement of the recoiling portions, the registering mechanism would be subject to a series of severe jars which would produce unsatisfactory results and would be likely to disarrange the counting mechanism.

64. ELECTRICAL HEATERS (92).

(i) **General.**

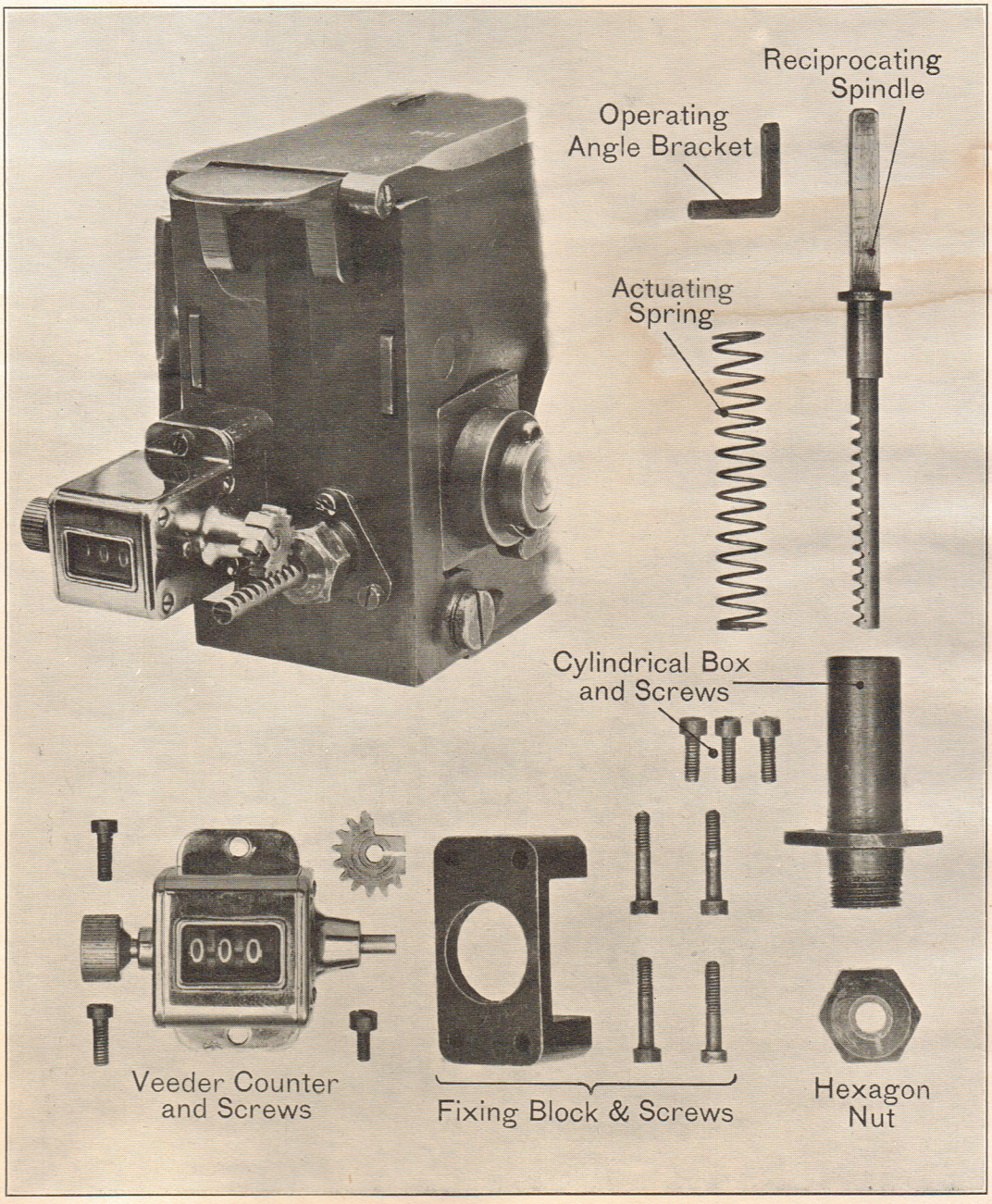
The electrical heaters are intended to counteract the effect of low atmospheric temperature by maintaining the breech mechanism of the gun at a sufficiently high temperature to prevent the lubricant from becoming so viscous as to impede the correct functioning of the gun.

(ii) **Description.**

Each heating set comprises two heaters. Each heater consists of a Nichrome element wound spirally on a flat mica former, enclosed between sheets of mica, and contained in a case made from sheet copper. The two ends of the nichrome ribbon are connected to two brass terminal screws (binding posts) which pass through the case to the outside of the heater and are used both for making the electrical connections and for fixing one end of the heater to the breech casing of the gun through *Insulating Bushes* (93). An insulating cap is provided to protect the ends of the terminal screws. A hole is formed in the heater at the opposite end to the screws, to take a copper rivet for fixing this end of the heater to the breech casing of the gun. A pair of twin flexible electric cables are provided, connected at one end to a standard *2-pin Plug socket* (94). The other ends of the cables terminate in eyelets for connection to the terminal screws on the heaters. The heater is operated off the 12-volt supply of the aircraft. The consumption of the heater is $2\frac{1}{12}$ amperes.

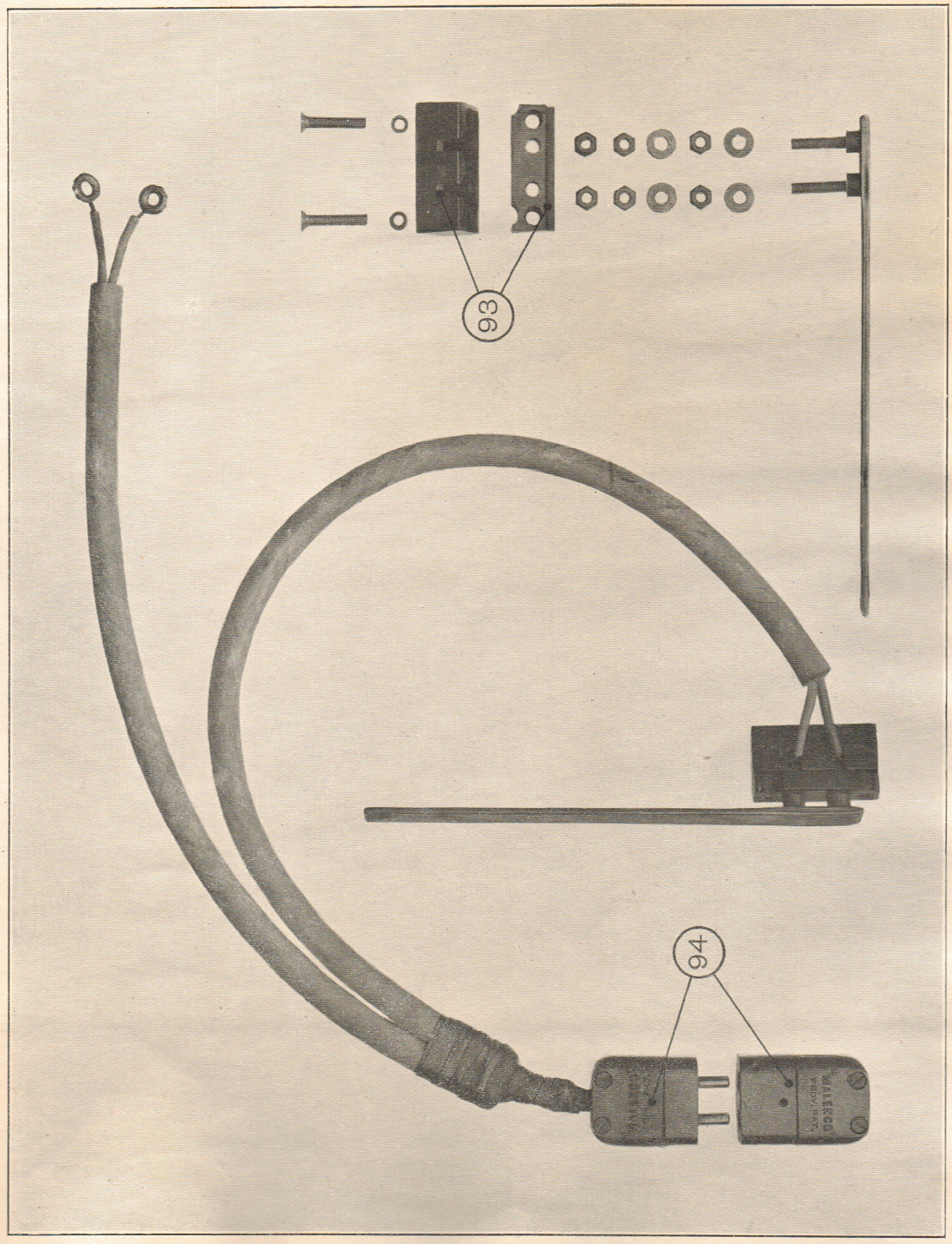
(iii) **Fitting.**

The two heaters are designed to be mounted inside the breech casing of the gun, one on each side, below the lock guides. Both the heaters are identical and interchangeable. *A Jig* (95) is provided for properly positioning the necessary holes in the breech casing for fixing the heaters.



The Rounds Counter.

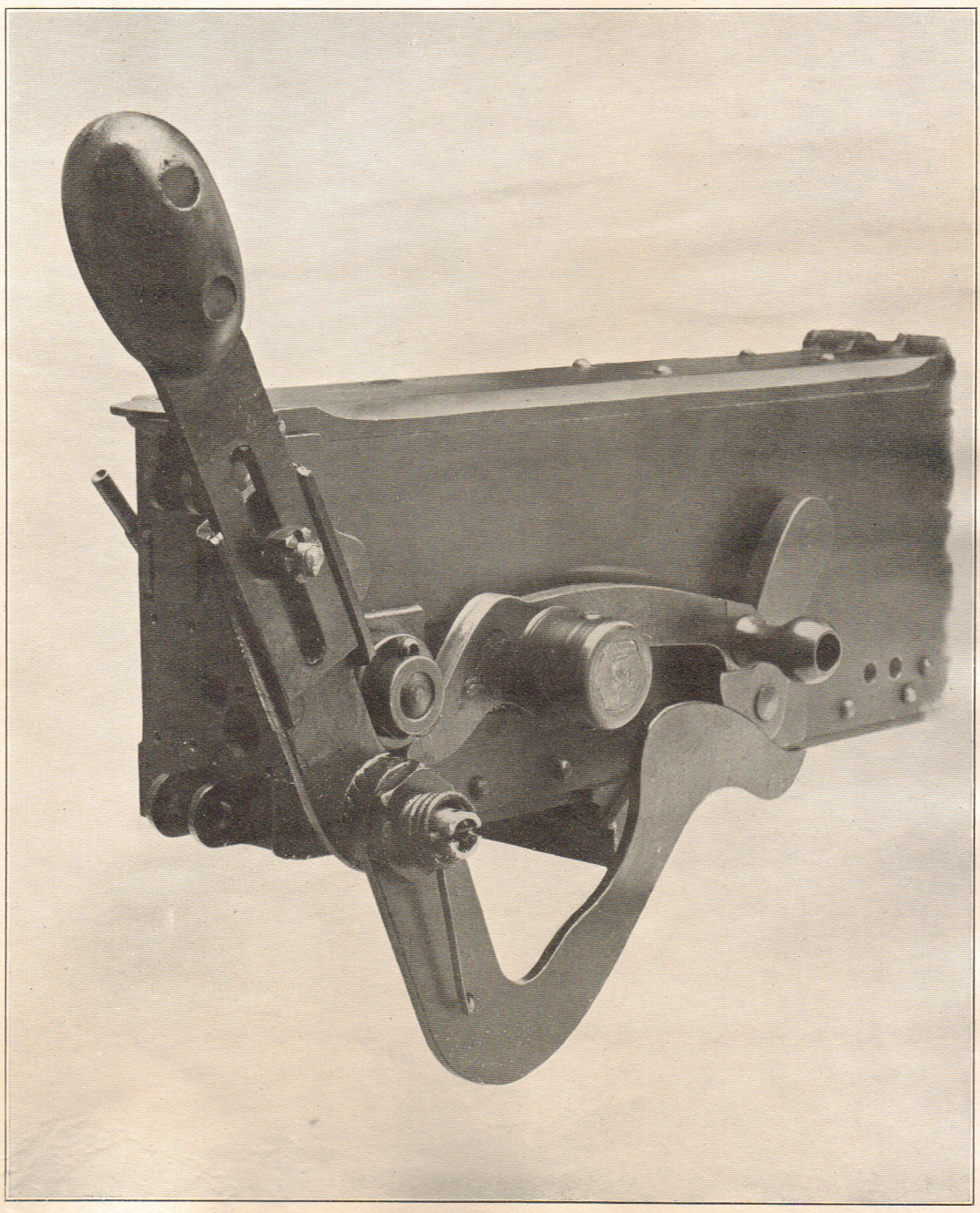
PLATE XIX.
(Part I. Chapter 1.)



Electric Gun Heater.

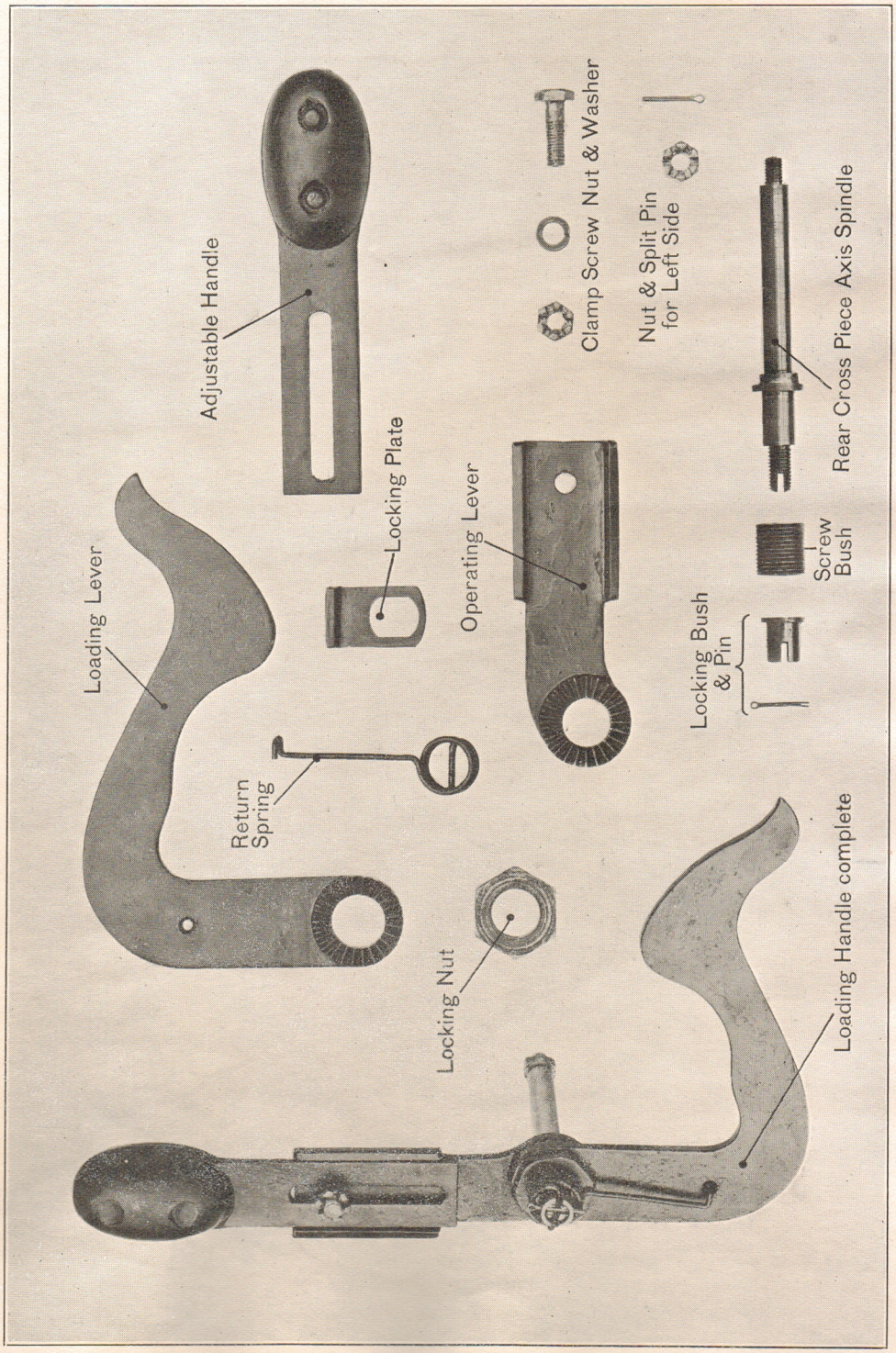
x 27947

PLATE XX.
(Part I. Chapter 1.)



Loading Handle fitted to Gun.

x 27947



Loading Handle, Complete and Stripped.

The jig should be mounted on the gun, and held in position by the clamping studs and nuts provided for the purpose, while the holes are being drilled. Two $\frac{1}{4}$-in. holes are required to take the terminals and one $\frac{1}{32}$ in. hole to take the rivet. The heater on the right-hand side is mounted on the gun with its terminal screws nearest the barrel, while the heater on the left-hand side is mounted in the reverse direction. When the heaters are being placed in position, the terminal screws should be passed through the holes in the side plates until the insulating bushes at the base of each screw fill the holes in the side plates. The insulating base pieces should then be slipped over the screws and fixed so as to clamp the heater to the side plate by means of a washer and nut on each screw. The other ends of the heaters should then be secured in position by means of copper rivets. The twin flexible cables attached to the 2-pin plug should be connected to the terminal screws of the heaters, one pair to each heater and secured by a nut and lock nut. The insulating cap should then be placed in position to cover the terminals, and the fixing screws screwed home. The cables are sufficiently long to allow the 2-pin plug to be taken to the rear of the gun; it should be attached to the gun mounting in any convenient position. The 2-pin socket should be wired up to the general 12-volt electric supply of the aircraft.

65. LOADING HANDLE (96).

(i) Description.

The loading handle consists of the following parts :—

(*a*) The *Rear Cross Piece Axis Spindle* takes the place of the *Rear Cross Piece Axis Pin.* This spindle has on the right-hand end (*i.e.*, the crank handle side of the gun) the following :—(1) a flange with two sides flattened off; (2) a circular flange (*Note.*—In older types this takes the form of a loose washer); (3) a straight portion; and (4) a threaded portion slotted and also drilled at right angles for a retaining split pin. The left-hand end of the pin is threaded to take a nut and drilled at right angles for a split pin.

(*b*) The *Locking Plate* fits over the flange (1) above so as to prevent the spindle from rotating.

(*c*) A *Screwed Bush* slides over the cylindrical bush of the rear axis cross piece spindle and is threaded externally. The inner end of this bush screws into the boss of the *Operating Lever.*

(*d*) The operating lever has a suitable boss formed at one end slightly off-set and cut with a thread similar to that of the threaded bush. Radiating from this hole are 24 splines. The rest of this lever is straight and it has a hole bored at the other end for the reception of the *Clamp Screw.* The sides of the lever, for about two-thirds of the straight portion, are turned up so as to form guides in which the straight portion of the *Adjustable Handle* may slide.

(*e*) The *Adjustable Handle* is straight and has a wooden handle at one end. The other end has a slot cut into it to provide adjustment for the clamp screw.

(*f*) The *Loading Lever* is cam-shaped so that it may reproduce the operations of loading and cocking the gun. A boss is formed at one end and has radial splines corresponding with those on the operating lever. This boss is drilled with a hole of sufficient diameter to give clearance to the threaded bush. A small hole is drilled in the straight portion for the anchorage of the *Return Spring.* The *Loading Lever* is locked to the *Operating Lever* by means of the *Locking Nut.*

(*g*) On to the *Rear Cross Piece Axis Spindle* is slid an assembly consisting of the following parts :—

(1) The operating handle.
(2) The loading lever.
(3) The screwed bush.
(4) The locking nut.

These parts are retained in position by the *Locking Bush* which screws on to the threaded portion of the right side of the rear cross piece axis spindle.

(*h*) The *Return Spring* is anchored in the hole in the operating lever, its other end being placed in the slot of the rear cross piece axis spindle. This serves to lock the *Locking Bush* in position. This end of the spring is kept in the slot by the *Retaining Split Pin.*

(ii) **Fitting.**

(*a*) Remove the rear cross piece axis pin.

(*b*) Insert the rear cross piece axis spindle with the locking plate on the collar, placing the slot in the extension in the horizontal position. Screw up the nut and place the split pin on the left side in position.

(*c*) Assemble the operating lever and the loading lever together (*i.e.*, engage the splines in the desired relative positions). Screw the screwed bush into the operating lever so that it is flush with the inner face of that lever. Screw the locking nut on to the screwed bush and tighten.

(*d*) Place the assembly detailed at (*c*) on the extension of the rear cross piece axis spindle.

(*e*) Screw the locking bush into position so that the slot in the locking bush coincides with the slot in the extension of the rear cross piece axis spindle. See that no end play exists in the assembly.

(*f*) Place the return spring over the locking bush with the long arm of the spring to the inside. Place the short arm of the spring in the slot provided. Hook the long arm of the spring into the anchorage hole of the operating lever.

(*g*) Insert the retaining split pin through the hole in the spindle and open it out.

(*h*) Place the adjustable handle in position on the end of the operating lever and fit the clamp screw, adjusting the handle so as to obtain the most comfortable position before tightening the clamp screw.

Note 1.—See that the nose of the operating lever is clear of the knob of the crank handle when in the forward position.

Note 2.—Test the loading handle after fitting by using a belt loaded with dummy rounds and see that it operates the recoiling portions correctly. If there is any stiffness in the fitting, the part concerned must be stoned down, otherwise the pilot will experience considerable trouble in getting the gun correctly loaded. The recoiling portions should be operated by hand (so as to reproduce the action of the gun during firing) and inspection should be made to see that the recoiling portions do not foul the loading handle assembly.

Note 3.—Care must be taken that the splines of the loading and operating handles are properly meshed and that the locking nut is screwed home.

Note 4.—The locking plate must be correctly fitted, so as to ensure the correct functioning of the return spring.

(iii) **Care and maintenance.**

(*a*) All parts of the loading handle, with the exception of the wooden grip, should be kept lightly covered with a thin film of P. 924 oil.

(*b*) The loading handle must be tested at frequent intervals to ensure that it has not been bent or damaged in any way, and that it works freely and correctly.

(*c*) The return spring should be of sufficient strength to prevent any possibility of the nose of the operating lever coming into contact with the bent of the crank handle due to vibration when the gun is firing. It is undesirable that this spring be excessively strong, as it merely places more work on the pilot when he operates the loading handle.

(*d*) In the event of burrs forming along the inner surface of the operating lever, they are to be carefully removed with a stone. Care should be taken not to alter the contour of the cam edges.

66. ATTACHMENT FOR THE USE OF THE GUN WITH BLANK AMMUNITION (97).

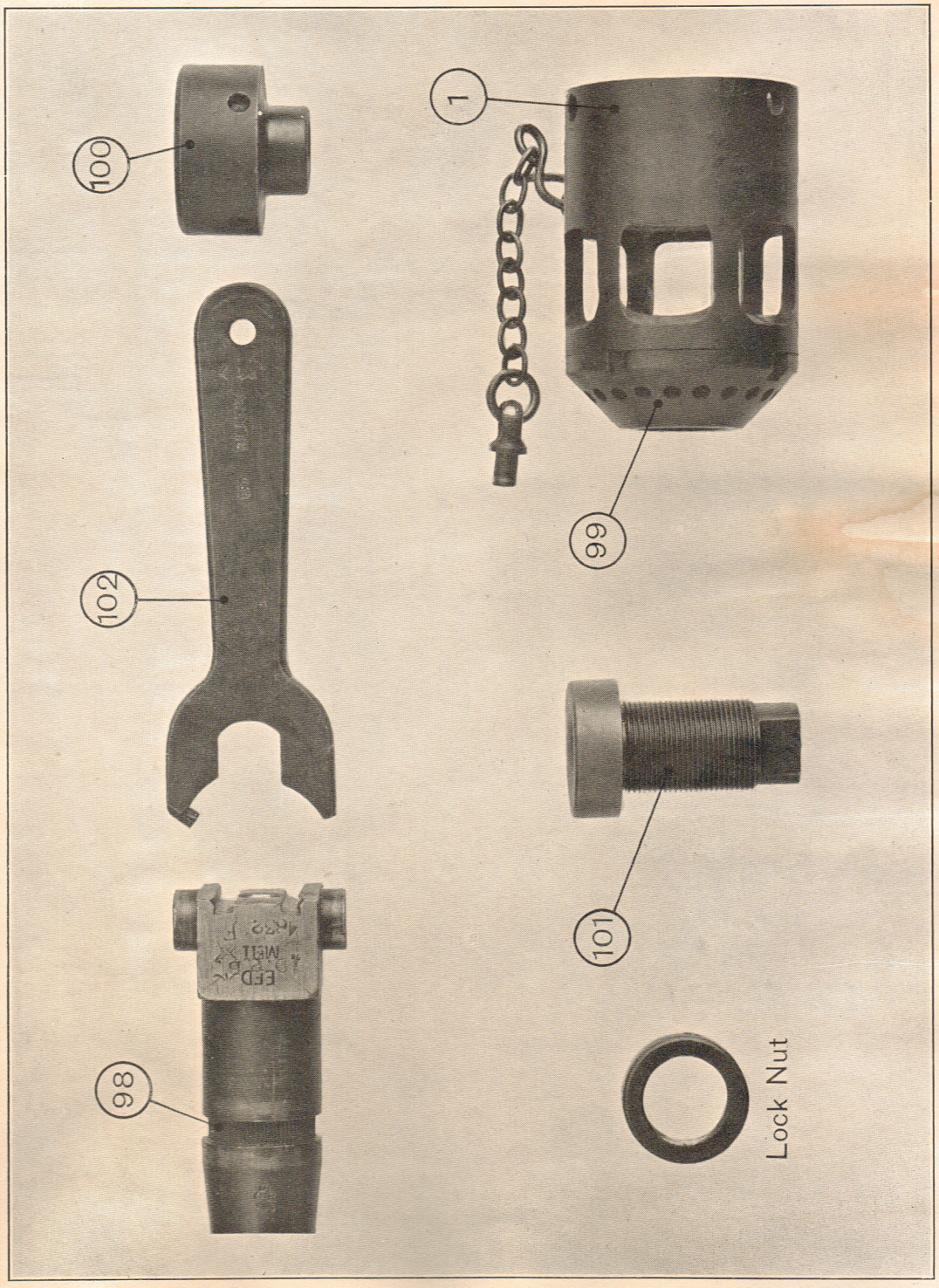
(i) **Special parts.**

In order that the gun may fire blank ammunition the following additional parts are required :—

(*a*) *Barrel Mk. II D.P.B.* (98).

(*b*) *Blank Firing Muzzle Attachment Cone* (99).

PLATE XXII.
(Part I. Chapter 1.)



Components of the Blank Firing Attachments.

x 27947

(c) *Blank Firing Muzzle Cup* (100).
(d) *Screw Adjusting Attachment Blank* (101).
(e) *Blank Firing Muzzle Attachment Spanner* (102).
(f) *Blank Firing Muzzle Attachment Adjusting Nut* (103).

(ii) **Fitting.**

The barrel is specially choked at the breech, and is marked " D.P.B." on the trunnion block. It replaces the ordinary service barrel when required. The muzzle cup assembles on to the " D.P.B." barrel in the ordinary way. The adjusting screw is screwed into the front cone from the rear so that its large end may engage in the muzzle cup. The front cone with adjusting screw assembles into the outer casing of the muzzle attachment in place of the existing front cone, and in order to prevent these cones from unscrewing during fire, they are issued to the Service assembled and permanently locked to the outer casing. The adjusting nut screws on to the projecting end of the adjusting screw and locks against the face of the front cone.

(iii) **Adjustment of the gun when assembled with the blank firing attachment.**

The weight of the recoiling portions must not exceed 2 lbs. The weight on the fusee spring must not exceed 4·5 lbs. The adjusting screw of the muzzle attachment should be screwed inwards to the muzzle cup until it just commences to force the recoiling portions to the rear. It should then be unscrewed two and a half turns and secured in position by the lock nut. The screw may require further adjustment in order to obtain correct functioning, and such adjustment should be made in quarter turns, but this screw should never be less than one turn back from the muzzle cup. Care should be exercised in the loading of ammunition belts, very tight or loose links not being used (very loose links will not hold the ammunition, and very tight links require excessive pull to extract the round from the feed block) as the energy available when using blank ammunition is not sufficient to overcome any excessive local friction.

(iv) **Life of the barrel.**

The choke in the breech end of the barrel is subject to wear by the action of the gases, and the average " life " of a barrel is about 1,500 rounds. The barrel will have a longer life if the gun is fired in short bursts (20 to 30 rounds) than in long bursts.

(v) **Points to be observed in the use of the blank firing attachment.**

Ammunition boxes and chutes must be temporarily modified for blank firing to ensure correct feed. A hard wood block, tapered off at its lower end should be held in position in the neck of the box to act as a lead to the cartridges which, having no bullets, are liable to move forward and so cause cross-feeds. Care should be taken that this packing piece allows sufficient clearance for the belt to feed freely. The split keeper-pin of the muzzle attachment should invariably be secured in position by wiring it to the outer casing and care should also be taken to see that the adjusting screw locking nut is screwed up tightly.

67. FLASH ELIMINATORS. (104 to 109.)

There is at present no Service type available for use (April, 1927). Various types are undergoing Service trials and on acceptance by the Service of a suitable type, the appropriate instructions will be issued and are to be inserted under this paragraph heading. Stores Vocabulary numbers 103–109 are left blank for this purpose.

GUNS, VICKERS, ·303 INCH, AIR-COOLED, MK. I*.

CONVERTED GROUND GUN.

68. The details of the Vickers Gun Mk. II and the *Vickers Gun Mk. I** (110) are similar, except as follows below. The paragraph numbers quoted correspond with those of the Vickers Gun Mk. II paragraphs and the two should be read concurrently. Being a war-time product it will be found that there is not the high degree of finish on the non-frictional surfaces and that no great effort has been made to reduce weight on the gun.

69. *Compare with para.* 1. *General Description.*

Nomenclature - - - - - -	Gun, Vickers, ·303 in., Air-cooled Mk. I*.
Weight - - - - - - - -	28·5 lbs. approx.
Marks on gun - - - - - -	(i) The number of the gun is shown at the rear top end of the barrel casing.
	(ii) As for the Mk. II gun.

70. *Compare with para.* 4. *Barrel Casing.*

(i) The barrel casing is greater in diameter, being painted externally and browned internally. No holes are drilled in the barrel casing, but louvres are cut in the rear end at the top and sides, which allow the escape of air. Air intakes are cut at the front end of it.

(iv) There is no threaded barrel bearing, its place being taken by the end cap of the barrel casing which is machined internally in a similar manner to the barrel bearing in the Mk. II gun.

(v) The guide through which the barrel enters the barrel bearing is a part of the end cap.

(vi) The rear end of the barrel casing is screwed and sweated into the cylindrical portion of the trunnion block.

71. *Compare with para.* 5. *The Trunnion Block.*

(iii) The flat vertical portion does not occur owing to the increased diameter of the cylindrical portion and the barrel casing.

(iv) The portion of the trunnion block extended to the rear is square and has the left upper corner removed to give clearance to the prolongation of the left inner side plate.

(v) No lightening holes are drilled in the lower portion of the trunnion block.

72. *Compare with para.* 11 (ii) (*b*). *Bottom Plate.*

(*b*) The distance bush is secured by a single grub screw to the centre line of the bottom plate.

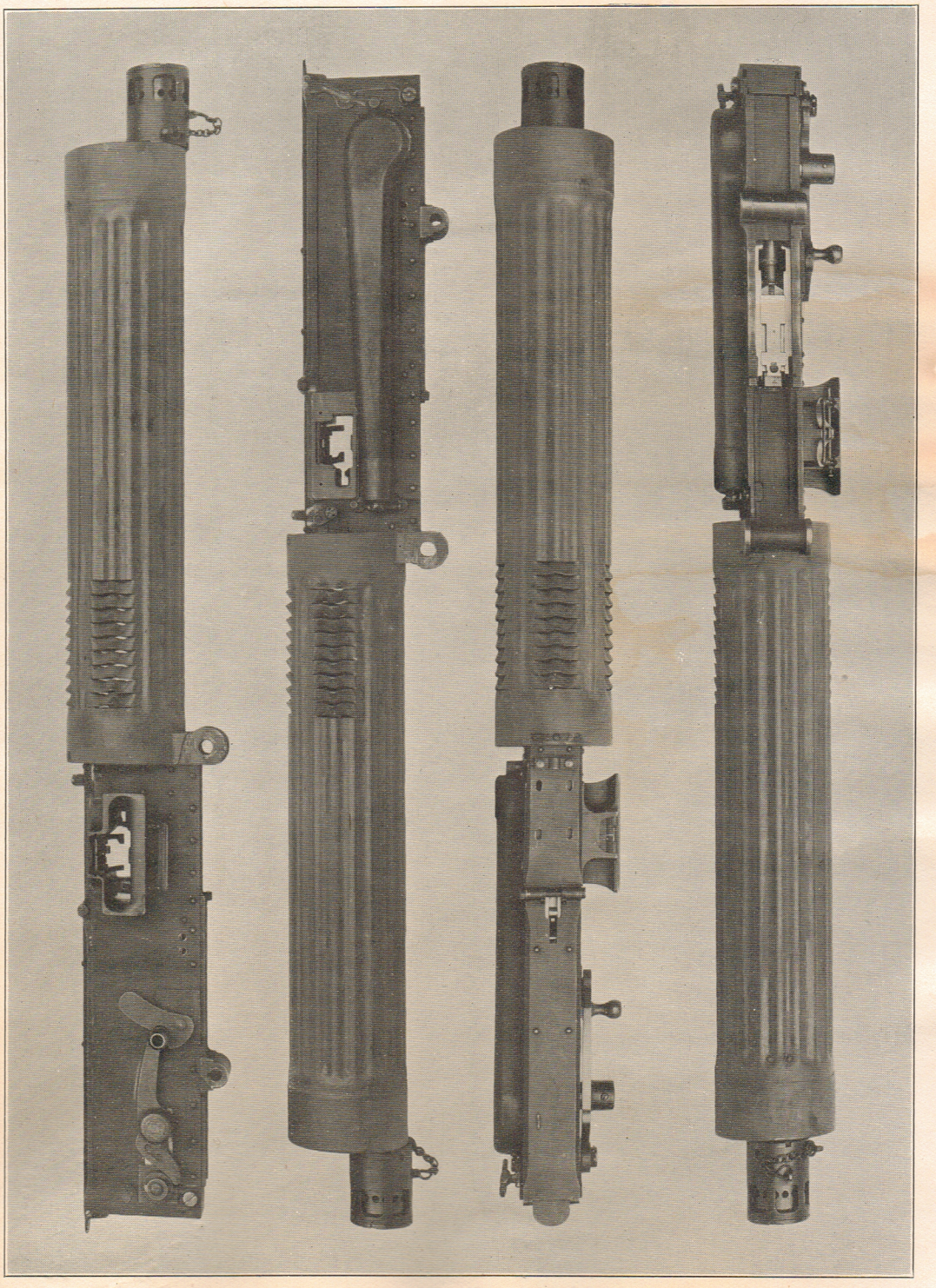
73. *Compare with para.* 44. *Stripping, General Remarks.*

(i) For Vickers Gun Mk. II read Vickers Gun Mk. I*.

74. *Compare with para.* 50. *General Points.*

(iv) Read—" The browning and/or paint " &c.

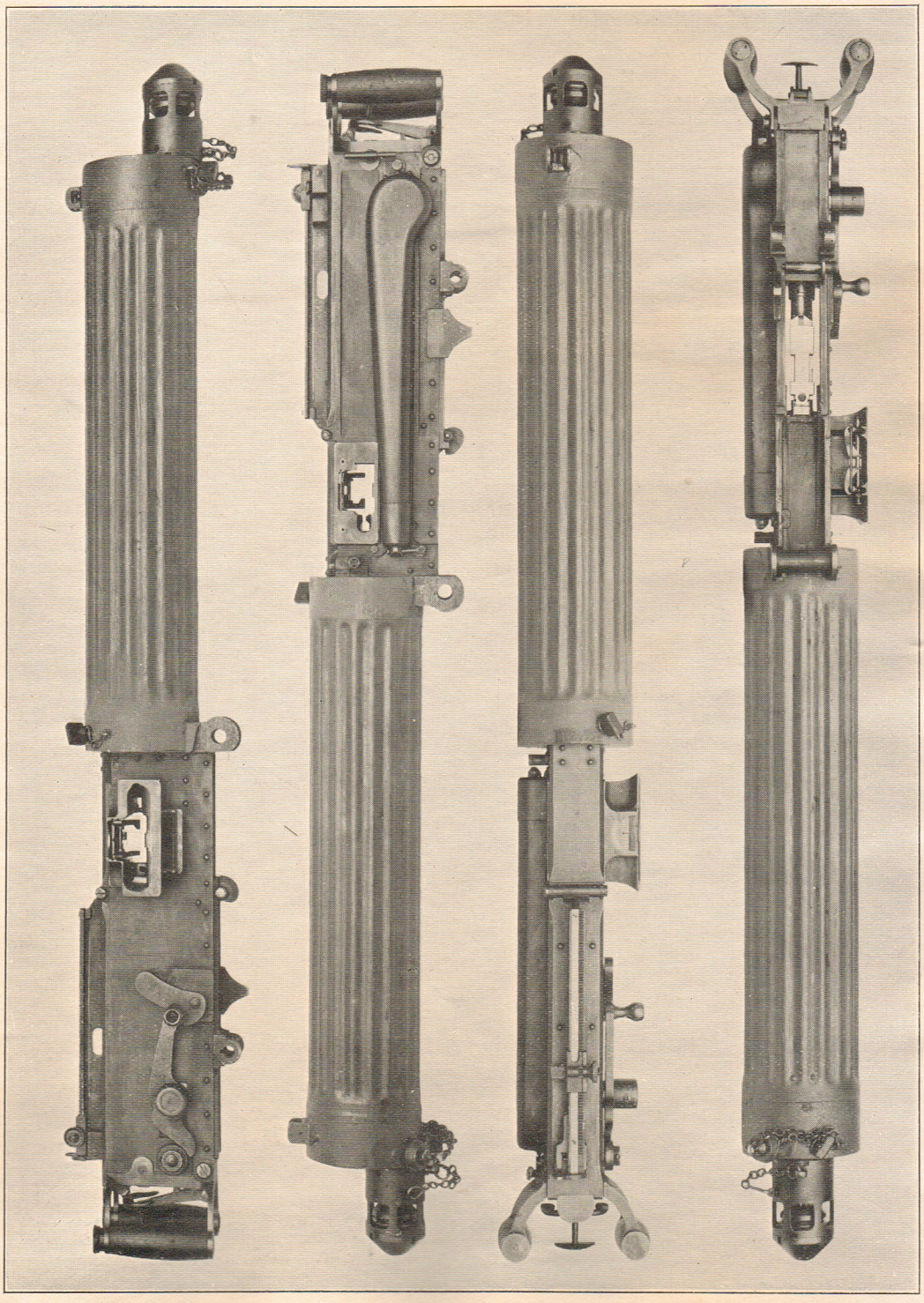
PLATE XXIII.
(Part I. Chapter 1.)



Vickers Gun, ·303-in. Air-cooled Mark I*.

x 27947

PLATE XXIV.
(Part I. Chapter 1.)



Vickers Gun, ·303-in. Water-cooled Mark I.

x 27947

GUNS, VICKERS, ·303 INCH, GROUND, MK. I.

75. The details of the Vickers Gun Mk. II and the *Vickers Gun Mk. I* (iii) are similar except as follows below. The paragraph numbers quoted correspond with those of the Vickers Gun Mk. II paragraphs and the two should be read concurrently.

76. *Compare with para 1. General Description.*

(i) Nomenclature	Gun, Vickers, ·303 in. Water-cooled Mk. I.
Weight	(*a*) With casing empty of water, about 36 lbs. (*b*) With casing filled, about 48¾ lbs.
Rate of fire	About 600 rounds a minute.
Length overall	43½ inches.
Working weight on fusee spring	8–12 lbs.
Marks on gun	(*a*) The number of the gun is shown at the rear top end of the barrel casing. (*b*) As for the Mk. II gun.
Sight	(*a*) Battle sights— (i) Aperture back 400 yds. (ii) Blade fore-sight. (*b*) Adjustable sight— (i) V-tangent back-sight. (ii) Blade fore-sight.

(ii) *Control of Fire.*

The gun is automatic in the sense that a sustained pressure on the firing lever will cause all the shots in the belt to be fired.

(iii) *Cooling System.* The barrel is cooled by being in contact with water. The gun is intended for land service only.

(iv) Delete this paragraph.

77. *Compare with para 3. The Non-recoiling Portions.*

(*a*) Add after " attachment," " and the steam tube."

78. *Barrel Casing.*

Delete the whole of para. 4 and substitute the following :—

(i) The barrel casing is made of steel and the surface is corrugated to stiffen it. The barrel casing is provided to serve as a container for the cooling water.

(ii)—(*a*) On the front end of the casing is fitted the *Muzzle Attachment.* This consists of the following portions :—the *Muzzle Attachment Outer Casing* (1) and includes the *Muzzle Cone* (112) and *Muzzle Disc* (113).

(*b*) The muzzle attachment outer casing is the same as that issued with the Mk. II and Mk. I* guns.

(*c*) The *Muzzle Cone* (112) is conical in front. At the rear of the conical portion are four serrations for fixing or removing it by the use of the *Combination Tool* (86). Behind this the diameter is threaded to screw into the *Muzzle Attachment Outer Casing* (1). Behind this the diameter is slightly smaller and is plain. The rear of the cone is bevelled outwards and then coned inwards, these surfaces being protected by the *Muzzle Disc* (113). The muzzle disc is of similar shape to the rear face of the muzzle cone and fits over it tightly, its function being to protect the surface of the muzzle cone from erosion caused by the action of the gases. The muzzle cone and disc are bored to allow the bullets to pass through them.

(iii) The description of the muzzle gland is the same as that fitted to the Mk. II and Mk. I* guns.

(iv) At the front end is the *Barrel Bearing*. This consists of a vertical portion, bored centrally to admit the barrel, and a curved sloping portion below to guide the barrel into the hole when the gun is being assembled. This curved portion takes the form of a brass trough which extends backwards for a distance of about 2 inches.

(v) The inside of the barrel casing is tinned to prevent rust.

(vi) The rear end of the barrel casing is screwed and sweated into the large cylindrica portion of the trunnion block.

(vii) At the top of the front face of the barrel casing is a hole to accommodate the screwed head of the *Steam Tube* (114), beside it being a small threaded hole which takes the keeper screw. For the first 2 inches of its length the barrel casing is plain. On the under-side of this portion are two holes. The one to the right is the *Emptying Hole*, which is threaded internally to take the *Screwed Plug* (115) which closes it. The hole on the left communicates with the *Steam Escape Tube* and is continued into a drilled boss which is closed by the *Cork Plug* (116). The boss is threaded externally for a *Retaining Ring* (117) which may be used to secure the *Condensing Pipe* (118) to the barrel casing. Both these plugs and the retaining ring are secured to the gun by short lengths of *Safety Chain*. On the upper side of the plain portion and slightly to the left is the *Foresight Bracket* which is pinned and sweated to the barrel casing. This bracket takes the form of two protecting wings and a small central block on which the *Foresight Blade* is fixed. At the rear end of the corrugated portion is a plain surface, at the top of which is the *Filling Hole* which is screwed internally to take the *Screwed Plug* (115) by which it is closed. This hole is placed slightly to the right in order to prevent the barrel casing from being completely filled, as otherwise this might lead to damage in frosty weather, and also to prevent the steam tube from being fouled by the funnel while the casing is being filled.

(viii) The *Steam Tube* (114) is made of brass and consists of two tubes. The longer and inner tube runs the whole length of the circular part of the barrel casing. Its rear end is conical and fits into a thimble fixed on the front surface of the *Trunnion Block*. At its front end is a threaded head which screws into the *End Cap* of the barrel casing. Near each end of the tube is a *Steam Entrance Hole*. In the screwed head is a third hole through which the steam passes into the *Steam Escape Tube*, the latter being secured to the inner surface of the *End Cap*. The screwed head is positioned by a *Keeper Screw* taking into a recess in the head and thus ensuring that the steam holes are correctly positioned, *i.e.*, that they are uppermost and that the third hole is opposite to the steam escape hole. The shorter and outer tube is free to move along the inner tube and is of such length that the steam entrance holes are never both covered at the same time. This tube forms a *Sliding Steam Valve*. This device allows the steam to escape whilst the water is retained.

79. *Compare with para.* 5. *The Trunnion Block.*

(iii) The flat vertical extension does not exist owing to the increased diameter of the barrel casing.

(iv) The trunnion block is square and has the left upper corner removed to give clearance to the prolongation of the left inner side plate.

(v) No lightening holes are drilled in the lower portion of the trunnion block, as they would permit water to escape from the barrel casing.

80. *Compare with para.* 6. *The Breech Casing.*

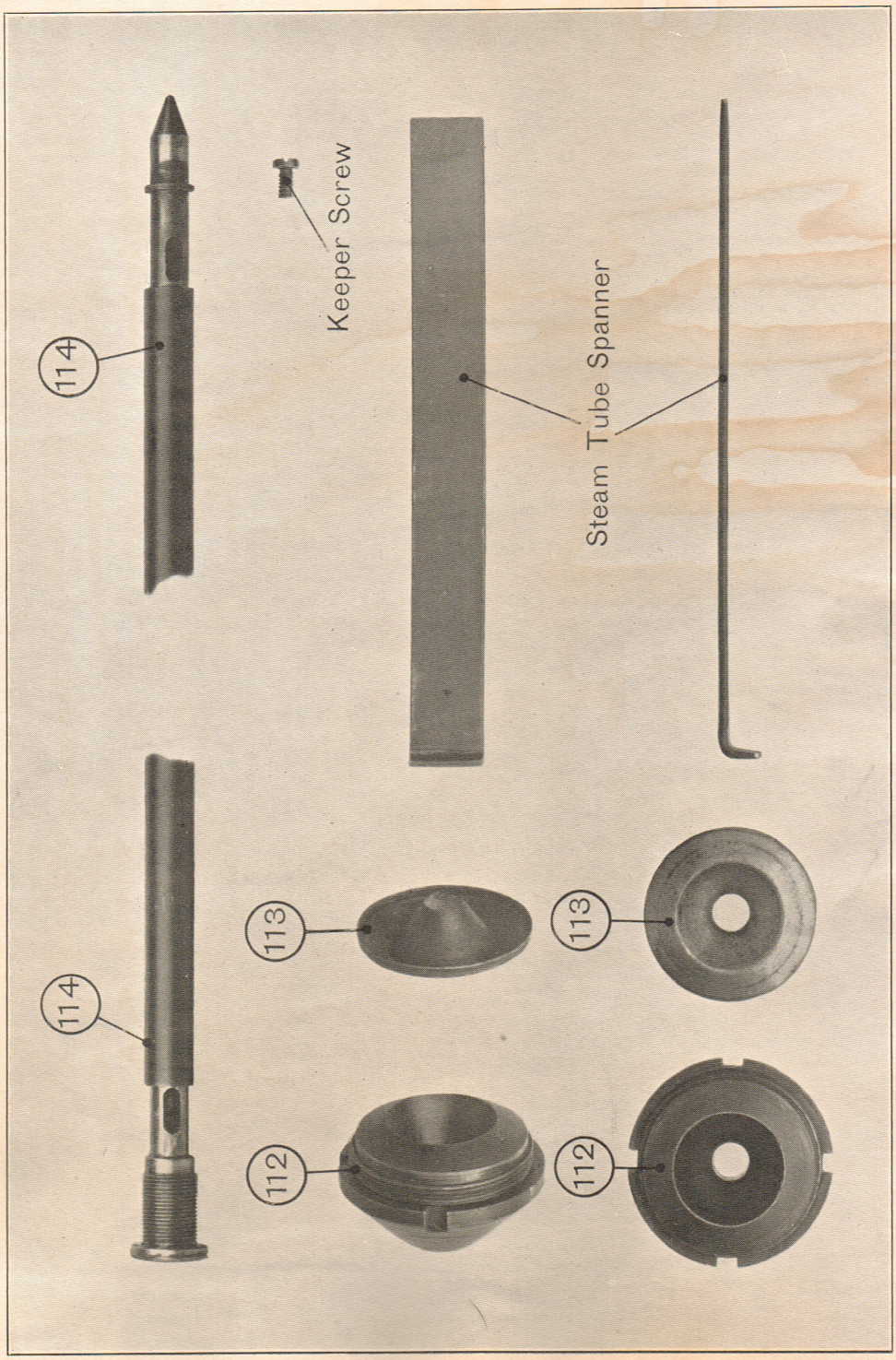
Add the following to sub-para. (iv) :—

(*h*) At a point slightly behind the middle of the left outer side plate is riveted the *Elevating Stop*. This is a pointed piece of metal to prevent excessive elevation being placed on the gun when on the tripod mounting.

81. *Compare with para.* 7. *Front Cover.*

(iii) Delete this paragraph.

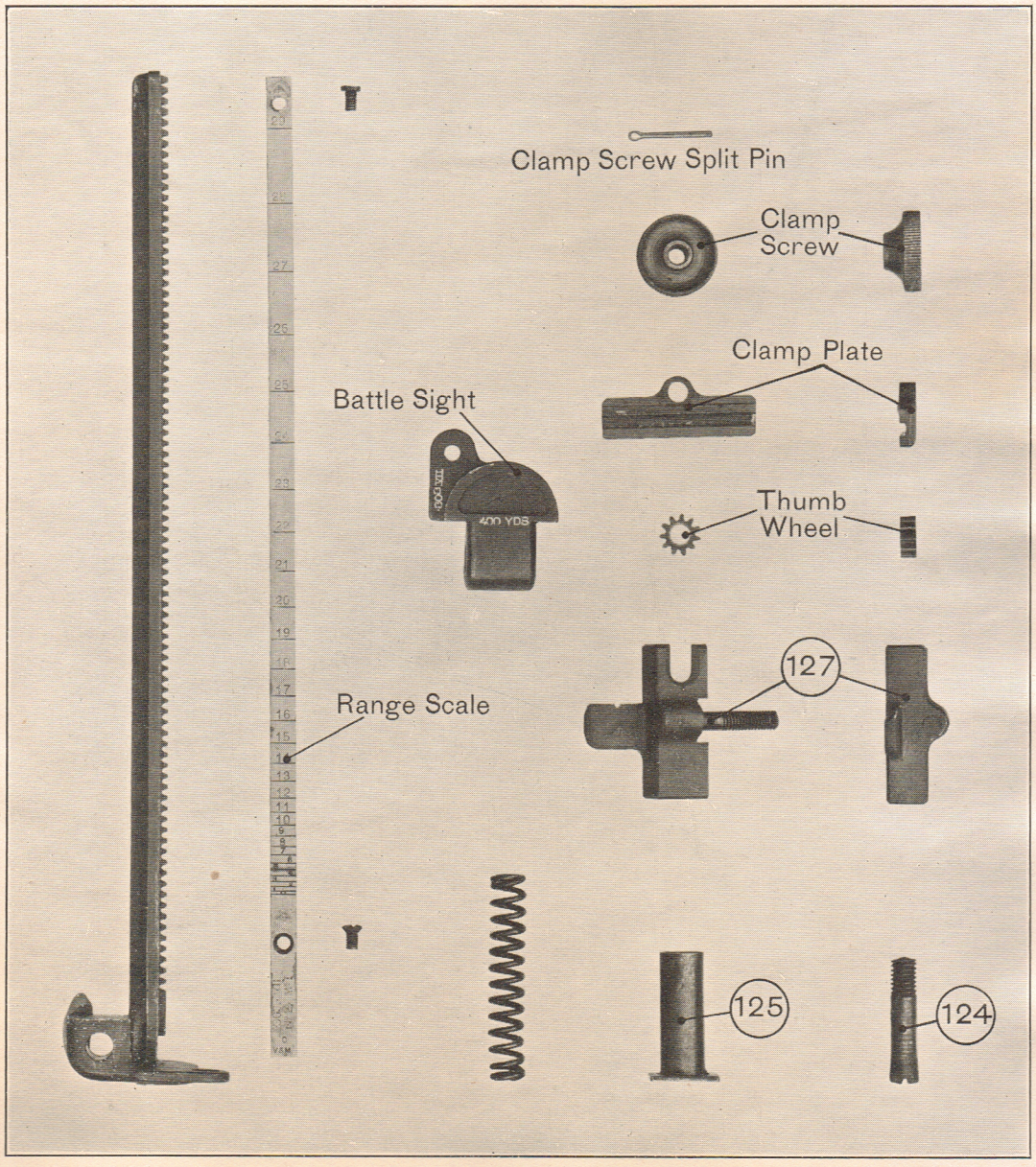
PLATE XXV.
(Part I. Chapter 1.)



Steam Tube and Spanner, Muzzle Cone and Disc

x 27947

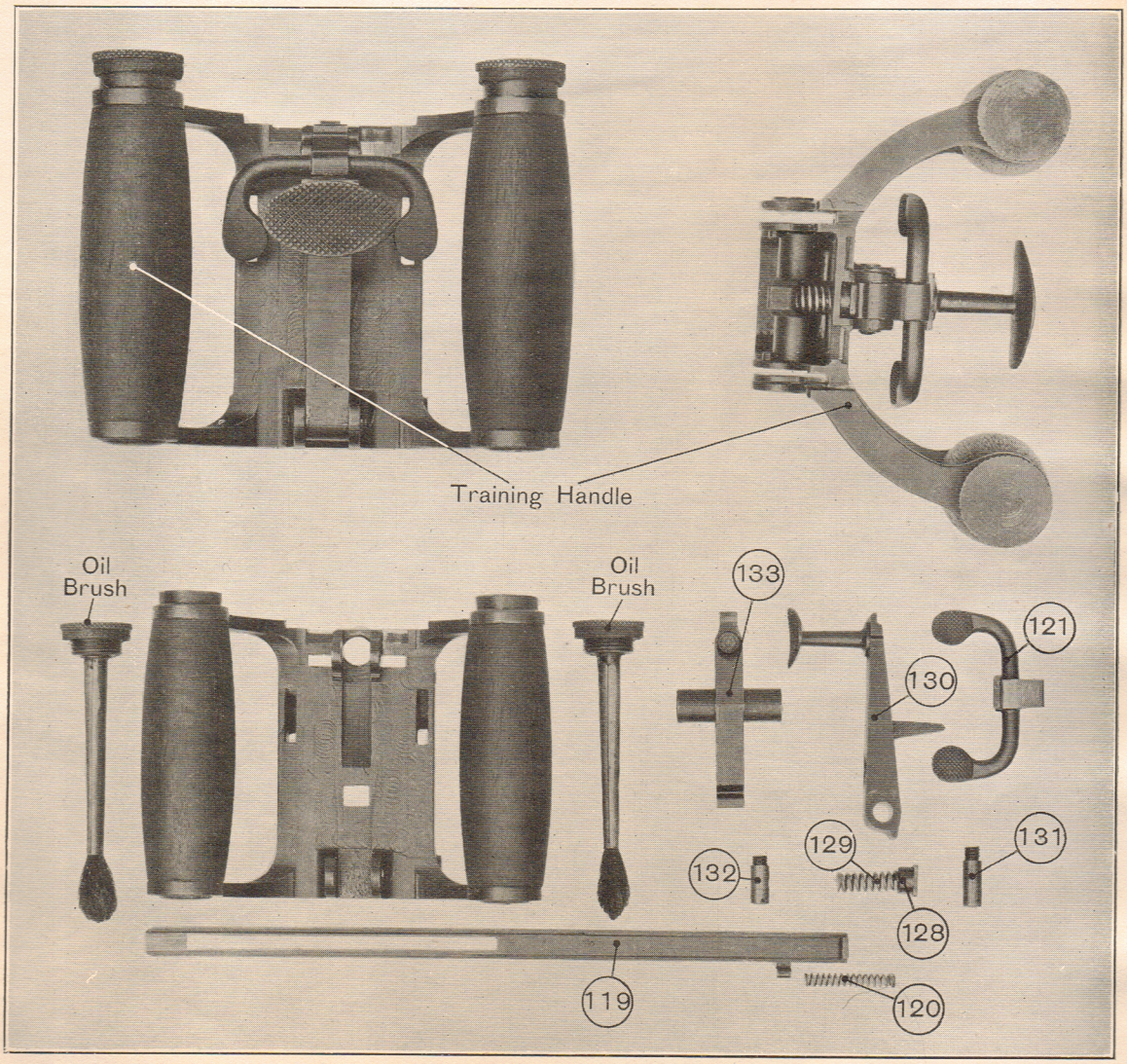
PLATE XXVI.
(Part I. Chapter 1.)



Tangent Rearsight.

PLATE XXVII.

(Part I. Chapter 1.)



Rear Cross-piece, &c.

82. *Compare with para.* 8. *Rear Cover.*

(iv) Delete this paragraph and substitute :—

The *Trigger Bar* (119) moves in the central channel, being retained therein by three small overhanging projections on either side. At the front end of the trigger bar is a *Slot* (cut for about half of its length) in which the tail of the trigger moves. Near the rear end on the right-hand side is a small lug, against which the *Trigger Bar Spring* (120) (a coil spring) bears. The other end of the spring bears against the *Rear Cover Lock* (29). The extreme rear end of the trigger bar is turned over to form an *Operating Lug.*

(v) Add the following :—

The *Rear Cover Lock* (29) is undercut at the rear to give working clearance to the *Safety Catch* (121).

Add the following :—

(vi) On the upper surface of the rear cover is a *Rib,* which acts as a support for the *Tangent Rear Sight* (122) when that part is folded down The rib has two projections on it at the front end which position the *Sight Stem* (123). The rear end of the rib terminates in two jaws which are bored transversely to take the *Tangent Sight Screw* (124). At the base of the jaws is a circular hole which forms a housing for the *Tangent Sight Piston* (125) and *Spring.* The tangent sight piston and spring act against the base of the sight stem and hold that part in either a vertical or horizontal position. The *Sight Stem* (123) terminates at its rear end in a block which is bored for the *Tangent Sight Screw* (124) and about which it can rotate. The rear face of the block (when the sight is folded down) is formed into a plate whose upper left hand corner is drilled to serve as an *Aperture Rear Sight.* This sight is harmonised for 400 yards and is known as the *Battle Sight.* The rear face of the sight bar (when erected) has a rack formed on it. The *Rear Sight Bracket* (127) slides along the sight stem and carries a *Clamp Plate, Thumb Wheel* and *Clamp Screw.* The rear sight bracket surrounds three sides of the sight stem, the fourth side being closed by the clamp plate. Projecting from the rear sight bracket, towards the right, is the *Clamp Bolt* which is threaded and pinned to it. The thumb wheel uses this bolt as an axis by means of which it engages with the rack of the sight bar. The clamp plate is drilled and passes over this bolt. The clamp bolt is drilled for a retaining *Clamp Screw Split Pin* at its outermost end. A plate projects to the left side of the rear sight bracket and carries a notch in its upper surface, which forms the rear sight U.

83. *Compare with para.* 9. *The Rear Cross Piece.*

(vii) Delete this sub-paragraph.

(viii) Add the following :—

In the middle near the top are three holes, the centre one being circular to admit the *Safety Catch Piston* (128) and *Spring* (129). Below and in the middle is another rectangular hole, which admits the *Pawl* on the *Firing Lever* (130). The rear face of the plate of the rear cross piece has two pairs of projections bored to accommodate respectively the *Safety Catch Axis Pin* (131) and the *Firing Lever Axis Pin* (132). In the middle of the plate is a vertical recess which admits the *Lug* on the *Safety Catch.* Extending from the corners of the plate at the top and the bottom are brackets to which are fitted the *Training or Traversing Handles.* These handles are hollow steel cylinders covered with wood. They form small reservoirs for oil, and are closed by milled plugs which screw into the cylinders and carry camel hair *Oil Brushes* (141) on the under side.

(*a*) *Trigger Bar Lever* (133).

This is cruciform in shape. At the top it is flattened to fit closely against the rear lug of the trigger bar. Immediately below the top on the rear face is a circular recess which forms a seating for the *Safety Catch Spring* (129). At the bottom on the same side is a horizontal recess for the *Pawl* of the *Firing Lever* (130). The horizontal arms of the trigger bar lever are bored to take the T-fixing pin, which acts as an axis for the trigger bar lever.

(*b*) *Safety Catch* (121).

This consists of a central part with extensions to the right and to the left, the ends of which are flattened, enlarged and milled on the under-side to form finger grips. The central portion is bored to take the *Safety Catch Axis Pin* (130) and has, at the top, a projection which limits the upward movement of the *Safety Catch*. On the under-side are two stops which control and limit the movement of the *Firing Lever* (130). The *Safety Catch* (121) is normally held in the "Safe" position by the *Safety Catch Piston* (128) and *Spring* (129). The former is a small hollow cylinder with a rectangular head and the spring is spiral.

(*c*) *Firing Lever* (130).

At the top this is slightly cut away to fit the stops of the safety catch. On its inner side it is recessed to accommodate the *Firing Lever Pawl*. Towards its lower end it increases in thickness and at the bottom it is bored to receive the *Firing Lever Axis Pin* (132). At its lower extremity on the inner side is a flattened portion which acts as a stop. Extending to the rear at the top is the *Firing Lever Thumbpiece*, which is T-shaped and has a curved flat plate milled on its rear face. The *Firing Lever Pawl* is wedge-shaped and bored to accommodate the axis pin on which it is fitted.

84. *Compare with para* 11. *Bottom Plate.*

(ii) (*b*) Delete "and joined together by a distance bush."

Add the following :—

(iii) The aperture in the under-side of the gun formed by the bottom plate may be closed by means of the *Sliding Shutter* (134). This sliding shutter is accommodated in grooves formed on the inside of the bottom plate. The sliding shutter is a flat plate having the front end upturned to fill in the space between the seating for ejection and the trunnion block. Behind the upturned portion is a tubular projection mounted transversely which houses the *Sliding Shutter Catch* (135). This catch is on the right, whilst one end of the *Sliding Shutter Plunger* (136) projects out of the left side of the tubular projection. The sliding shutter catch is operated by a milled projection and a milled circular plate, these parts affording a grip. On the upper side of the sliding shutter catch is a small stud operated by a *Spiral Spring* (137), which engages in recesses cut at the limit of travel of the sliding shutter in the right portion of the bottom plate. The safety catch is retained in place by a *Fixing Pin* (138). The plunger limits the forward movement of the sliding shutter by contact with a raised stop on the left side of the gun.

85. *Compare with para.* 13. *Feed Block, Left Hand.*

This type of feed block is not used on ground guns.

86. *Compare with para.* 16. *The Barrel Mk. II.*

Add to (i) :—The asbestos should be packed fairly tightly into the cannelure in order to prevent water escaping past it from the barrel casing. The asbestos should be well oiled.

87. *Compare with para.* 17. *Muzzle Cup.*

Add the following :—

A ·05 *in. washer* (139) is interposed between the end of the barrel and the muzzle cup.

88. *Compare with para.* 18. *Right and Left Inner Side Plates.*

(vi) Delete the second sentence.
(vii) Delete the last sentence.

89. *Compare with para.* 23. *Mechanism.*

Add to (ii) the following :—

by means of the *Trigger Bar*.

90. *Firing Action. Delete para.* 32 *and substitute the following :—*

(i) *Firing Action* (*Opening or Resuming Fire*).

When the thumb-piece is pressed, the firing lever pawl is moved forward and acts on the tail of the trigger bar lever, causing it to rotate and thus forcing the head to the rear. The head of the trigger bar lever is in contact with the lug on the trigger bar and the trigger bar is therefore caused to move to the rear. The forward end of the slot in the trigger bar engages against the tail of the trigger and moves to the rear, thus disengaging the tail of the trigger from the bent of the tumbler ; the lock spring is then free to exert itself, which it does and carries the firing pin on to the cap of the cartridge.

Note.—Before the thumb-piece can be depressed it is necessary to pull the safety catch to the rear in order that the lug on the face of the thumb-piece may clear the rear projection of the safety catch.

(ii) *Firing Action* (*Continuous Fire*).

While pressure is being maintained on the thumb-piece of the firing lever, the firing lever pawl is held forward, thus keeping the head of the trigger bar lever to the rear. This holds back the trigger bar so that, as the lock goes forward, the tail of the trigger is tripped before the lock is quite home. The nose of the trigger is in consequence prevented from engaging in the bent of the tumbler as described in para. 28, and when the sear is depressed, the firing pin, acting under the influence of the lock spring, moves forward and strikes the cap of the cartridge.

(iii) *Cessation of Fire.*

When the pressure on the thumb-piece is released, the safety catch spring presses forward the top of the trigger bar lever and allows the trigger bar to go forward under the influence of its own spring. When therefore the lock comes forward again, the tail of the trigger fails to reach the end of the slot in the firing lever, and the nose of the trigger remains in contact with the bent of the tumbler. Consequently when the sear is depressed, the forward movement of the firing pin is interrupted by the engagement of the nose of the trigger in the bent of the tumbler. The firing pin is therefore unable to reach the cap of the round in the chamber.

91. *Loading Action. Delete para.* 34 *and substitute the following :—*

Loading by Hand.

(i) In order that this operation may be carried out correctly two persons are required : No. 1, the Firer; No. 2, the Loader. These numbers will be used in describing the respective duties in the following paragraph.

(ii) No. 1 pulls the crank handle as far to the rear as possible. No. 2 places the tag of the belt in the feed block. This protrudes out of the left side and is seized and pulled through by No. 1 as far as he is able. No. 1 allows the crank handle to go forward. The above actions are repeated once ; the gun is then loaded.

Note.—(*a*) As the lock is the only part of the recoiling portions that moves, the first and second actions of the feed block are carried out by No. 1 pulling the belt through to the left.

(*b*) The above loading action is only carried out when a web belt is used and the gun is employed as a ground gun.

92. *Compare with para.* 39. *Table of Immediate Action.*

It is undesirable to teach two separate sets of immediate action. The table set out in para. 40 should be applied, therefore, to the correction of stoppages in the ground gun as far as possible.

93. *Compare with para.* 41. *Points to be observed during flight or butt practices.*

(iii) For " two pounds " read " four pounds."

(v) Delete the second sentence and substitute the following :—

" The muzzle disc should be clean and bright." Delete " and the buffer spring correctly positioned."

CHAPTER 1.
PARAS. 93–99.

(vi) Delete.
(ix) Either link belts, canvas or web belts can be used with the ground gun.
(x) and (xi) Delete.
(xiii) Delete, and substitute the following :—
" See that the sliding shutter is open."

(xiv) Delete, and substitute the following :—
" See that the barrel casing is full of water and the steam tube correctly positioned."

(xv) to (xix) Delete, and substitute the following :—
" See that the sights are set to the correct range."

94. *Points to be observed during flight. Delete para.* 42.

95. *Compare with para.* 44. *Stripping.*
(i) For " Vickers Gun Mk. II " read " Vickers Gun Mk. I."
(vii) Add " See that the sliding shutter is opened before replacing lock."
(ix) Delete sentence in brackets.

96. *Compare with para.* 45. *Sequence of stripping the gun.*
(i) Delete.

97. *Compare with para.* 46. *Details of stripping the gun.*
In (iii) delete the following :—
Withdraw the buffer spring. Withdraw the locking washer with the threaded portion of the T-fixing pin screwed into the hole provided.

(viii) Delete.

98. *Compare with para.* 47. *Re-assembling.*
(vii) Delete the reference to the left hand feed block.
In (viii) delete the following :—
Replace the locking washer. Remove the T-fixing pin. Replace the buffer spring.

99. *Compare with para.* 48. *Details of stripping component parts.*
(iv) Delete.
(vii) Delete, and substitute the following :—
(vii) *Rear cover.*
(*a*) *To strip :—*
(1) Unscrew and take out the rear cover lock axis pin.
(2) Remove the cover lock and spring.
(3) Remove the trigger bar spring.
(4) Remove the trigger bar.
(5) Remove the tangent sight screw.
(6) Take off the tangent sight.
(7) Remove the tangent sight piston and spring.
(*b*) *To reassemble :—*
Reverse the above procedure.

(viii) Delete, and substitute the following :—

(viii) *Muzzle Attachment Outer Casing.*

(*a*) *To strip :—*

Using the combination tool, unscrew the muzzle cone from the muzzle attachment outer casing.
Remove the muzzle disc from the muzzle cone.

(*b*) *To reassemble :—*

Reverse the above procedure.

Add the following :—

(ix) *Tangent Rear Sight.*

(*a*) *To strip :—*

(1) Remove the clamp screw split pin.
(2) Remove the clamp screw.
(3) Draw off the clamp plate.
(4) Draw off the thumb wheel.
(5) Remove the rear sight bracket.
(6) Unscrew the scale retaining screws.
(7) Remove the scale.

(*b*) *To reassemble :—*

Reverse the above procedure.

Add the following :—

(x) *Rear Cross Piece.*

(*a*) *To strip :—*

(1) Remove the firing lever axis pin.
(2) Remove the firing lever.
(3) Remove the safety catch axis pin.
(4) Remove the safety catch, safety catch spring and plunger.
(5) Lift out the trigger bar lever.
(6) Unscrew the knurled caps and lift out the brushes.

(*b*) *To reassemble :—*

Reverse the above procedure.

100. *Compare with para.* 50. *General points.*

(v) Delete first sentence and substitute :—

" The muzzle disc and muzzle cup tend to foul after about 600 rounds."

Add the following :—

" (viii) See that the sliding shutter is open before replacing the lock in the gun."

101. *Compare with para.* 51. *Cleaning of guns—General.*

(ii)—(*a*) Delete " the buffer spring " and substitute " the muzzle cone and the muzzle disc." In last sentence but one delete " buffer spring " and substitute " muzzle disc."

(ii)—(*b*) Delete " locking washer " and add " steam tube." Delete the last two paragraphs and substitute :—

" The barrel casing should be carefully emptied and every endeavour made to ensure that it is dry. The steam tube should be dried but not oiled."

CHAPTER 1.
PARAS. 102–110.

102. *Compare with para.* 52. *Lubrication of the gun.*

Delete the first two sentences. Substitute as follows :—

"The gun must be oiled sparingly on account of the possibility of its picking up dirt, dust, &c. whilst in action. The oil to be used is known as *Oil G.S.* (140). This oil should be applied with a camel hair brush.

Add to last paragraph "Rear cross piece and rear cover."

103. *Compare with para.* 54. *Periodical examination of gun.*

(i) For "muzzle cylinder" read "muzzle cone and disc."

(iii) Delete this sub-paragraph and substitute :—

"*Trigger bar* —The trigger bar should move freely in its slot."

Add "(x) *Tangent rear-sight.*—See that the rear sight bracket moves freely for the whole length of the range scale. See that the clamp screw functions correctly."

Add "(xi) *Fore-sight.*—See that this is not damaged."

Add "(xii) *Safety chains, filling and draining plugs.*—See that all these items are correct."

Add "(xiii) *Rear cross piece.*—See that the hand firing mechanism is free and clean. See that the oil brushes are correct."

104. *Compare with para.* 55. *Repairs and Adjustments.*

(vi) For "12 lbs." read "14 lbs."

105. *Compare with para.* 56. *Instructions for weighing the recoiling portions.*

(i) Delete.

(v) For "2 lbs." read "4 lbs."

106. *Compare with para.* 59. *Instructions for the renewal of the front packing.*

(iii) Delete.

At the end of para. 59 add the following :—

Instructions for the renewal of the rear packing :—

(i) Remove the barrel from the gun.

(ii) Replace the asbestos yarn, having first oiled it, by winding it into the cannelure. The asbestos should be pressed tightly in, entirely filling the cannelure, but care should be taken that no asbestos overlaps the sides.

(iii) Replace the barrel in the gun.

(iv) Hang the lock.

(v) Work the recoiling portions backwards and forwards to ensure that they move freely.

(vi) If the packing is found to set up too much friction, withdraw and remove one or two strands of asbestos yarn.

(vii) Test the weight of the recoiling portions.

107. *Compare with para.* 62. *Spare parts and tools that should be taken with the air.*

The articles enumerated in this para. should be in the possession of the firer when ground guns are being fired.

108. *Compare with para.* 63. *The Rounds Counter and Mechanism.*

This attachment cannot be fitted to the Vickers ground gun.

109. *Compare with para.* 64. *Electrical Heaters.*

Electrical heaters are not required for use with the ground gun and the side plates are not drilled for the binding posts and rivets.

110. *Compare with para.* 65. *Loading Handle.*

This cannot be fitted to guns which have traversing handles on the rear cross piece.

111. INDEX GIVING VOCABULARY NAMES OF PARTS.

Note.—All stores in this index are in Section 7A unless otherwise quoted.

(1) Guns, Vickers, ·303 in., Accessories, Casings, outer, muzzle attachment.
(2) ,, ,, ,, Spare Parts A, Cylinders muzzle.
(3) ,, ,, ,, Accessories, Pins, split, fixing muzzle outer casing.
(4) ,, ,, ,, ,, Gland, muzzle attachment.
(5) ,, ,, ,, Spare Parts A, Springs, buffer.
(6) ,, ,, Asbestos, Yarn 3, 6, 9 or 12 thread (in 2-oz. balls) (Section 32b).
(7) Guns, Vickers, ·303 in., Accessories, Washer locking gland muzzle attachment.
(8) ,, ,, ,, ,, Catches, front cover.
(9) ,, ,, ,, Spare Parts B, Blocks feed right hand.
(10) ,, ,, ,, Accessories, Pins, screwed joint cover.
(11) ,, ,, ,, ,, Slides, right.
(12) ,, ,, ,, ,, ,, left.
(13) ,, ,, ,, Spare Parts B, Pins "T" fixing, rear cross piece.
(14) ,, ,, ,, Accessories, Pins, screwed joint rear cross piece.
(15) ,, ,, ,, ,, Brackets, check lever, Mk. II.
(16) ,, ,, ,, ,, Levers, check.
(17) ,, ,, ,, ,, Pins, keeper, check lever.
(18) ,, ,, ,, ,, Rollers.
(19) ,, ,, ,, Spare Parts A, Collars, roller.
(20) ,, ,, ,, ,, ,, ,, Pins, split, collar, roller.
(21) ,, ,, ,, Accessories, Cover, front.
(22) Gears C.C., Type C Trigger Motors, Brackets adjusting left-hand screw (Section 8).
(23) Guns, Vickers, ·303 in., Spare Parts A, Plungers, front cover catch.
(24) ,, ,, ,, ,, ,, Springs, front cover catch.
(25) ,, ,, ,, ,, ,, Plugs, front cover catch.
(26) ,, ,, ,, ,, Pins, split, keeper front cover catch.
(27) ,, ,, ,, Accessories, Covers, rear.
(28) ,, ,, ,, ,, Pins axis, cover lock.
(29) ,, ,, ,, ,, Locks, cover, rear.
(30) ,, ,, ,, Spare Parts A, Springs, rear cover lock.
(31) ,, ,, ,, Accessories, Bodies, cross piece rear.
(32) ,, ,, ,, ,, ,, feed block (right hand).
(33) ,, ,, ,, ,, Pins, split, fixing, levers feed block.
(34) ,, ,, ,, ,, Levers, top feed block.
(35) ,, ,, ,, ,, ,, bottom feed block.
(36) ,, ,, ,, ,, Slides, feed block.
(37) ,, ,, ,, Spare Parts A, Springs, top pawl, Mk. I or II.
(38) ,, ,, ,, Accessories, Pins, axis, top pawl feed block.
(39) ,, ,, ,, ,, Pawls, top, front and/or rear, feed block.
(40) ,, ,, ,, ,, ,, bottom, front, feed block.
(41) ,, ,, ,, ,, Pins, axis, bottom, pawl, feed block.
(42) ,, ,, ,, Spare Parts A, Springs, bottom, pawl, feed block.
(43) ,, ,, ,, ,, B, Blocks, feed, left hand.
(44) ,, ,, ,, Accessories, Bodies, feed block (left hand).
(45) ,, ,, ,, ,, Levers, cam, left hand, feed block.
(46) ,, ,, ,, ,, ,, slide, left hand, feed block.
(47) ,, ,, ,, ,, Pawls, retaining, left hand, feed block.
(48) ,, ,, ,, ,, Pins, screwed, axis, pawls retaining, left hand, feed block.
(49) ,, ,, ,, ,, Springs, special, left-hand feed block.

(50) Guns, Vickers, ·303 in., Spare Parts A, Fusees, with chain.
(51) ,, ,, ,, Accessories, Springs, fusee with fittings.
(52) ,, ,, ,, ,, Boxes, fusee spring.
(53) ,, ,, ,, ,, Screws, adjusting fusee spring.
(54) ,, ,, ,, ,, Barrels, Mk. II.
(55) ,, ,, ,, Spare Parts A, cups, muzzle attachment, Mk. II.
(56) ,, ,, ,, Accessories, Plates, side, left or right.
(57) ,, ,, ,, ,, Springs, side plate, left or right.
(58) ,, ,, ,, ,, Cranks.
(59) ,, ,, ,, ,, Pins, crank, fixing crank pin.
(60) ,, ,, ,, ,, Handles, crank, Mk. I*.
(61) ,, ,, ,, ,, Pins, screwed, fixing crank handle.
(62) ,, ,, ,, ,, Springs, connecting rod.
(63) ,, ,, ,, ,, Rods, connecting.
(64) ,, ,, ,, ,, Nuts, adjusting connecting rod.
(65) ,, ,, ,, Spare Parts A, Washers, adjusting, ·003 in. *or* ·005 in.
(66) ,, ,, ,, ,, ,, Locks, service.
(67) ,, ,, ,, Accessories, Casings, lock.
(68) ,, ,, ,, ,, Levers, side.
(69) ,, ,, ,, Spare Parts A, Bushes, axis, side lever.
(70) ,, ,, ,, ,, ,, Pins, split, bush, axis, side lever.
(71) ,, ,, ,, ,, ,, Levers, extractor, right or left.
(72) ,, ,, ,, ,, ,, Pins, axis tumbler.
(73) ,, ,, ,, ,, B, Triggers.
(74) ,, ,, ,, ,, A, Pins, axis trigger.
(75) ,, ,, ,, ,, B, Tumblers.
(76) ,, ,, ,, ,, A, Pins, firing.
(77) ,, ,, ,, ,, B, Sears, with spring.
(78) ,, ,, ,, Accessories, Springs, sear.
(79) ,, ,, ,, Spare Parts A, Springs, lock.
(80) ,, ,, ,, Accessories, Extractors.
(81) ,, ,, ,, Spare Parts A, Gibs. No. 2.
(82) ,, ,, ,, Accessories, Springs, gib.
(83) ,, ,, ,, ,, Covers, gib spring.
(84) ,, ,, ,, ,, Catches, cover.
(85) ,, ,, ,, ,, Springs, main.
(86) ,, ,, ,, Spare Parts B, Tools combination.
(87) ,, ,, ,, Accessories, Chests, ·303 in. Vickers Gun.
(88) Jelly, mineral, red. (Section 33–A).
(89) Beeswax. (,, 33–A).
(90) Oil, guns (P. 924). (,, 34).
(91) Guns, Vickers, ·303 in., Accessories, Counters, round.
(92) Heaters, gun, electrical, Vickers, 12 volt, 25 watts (Section 5–C).
(93) ,, ,, ,, ,, Spares, Blocks, terminal (,, 5–C).
(94) ,, ,, ,, ,, ,, Plugs and sockets (,, 5–C).
(95) Jigs, electrical gun heater, Vickers gun (Section 5–C).
(96) Guns, Vickers, ·303 in., Accessories, Handles, loading, Mk. III.
(97) ,, ,, ,, Attachments, Blank firing, complete.
(98) ,, ,, ,, ,, Barrels, Mk. II. D.P.B.
(99) ,, ,, ,, ,, Cones, front, muzzle attachment blank.
(100) ,, ,, ,, ,, Cups, muzzle attachment blank.
(101) ,, ,, ,, ,, Screws, adjusting muzzle attachment blank.
(102) ,, ,, ,, ,, Spanner, muzzle attachment blank.
(103) ,, ,, ,, ,, Nuts adjusting, muzzle attachment blank.

(104)
(105)
(106)
(107)
(108)
(109)
(110) **Guns, Vickers, ·303 in.,** Air-cooled, Mk. I*.
(111) ,, ,, ,, Ground, Mk. I.
(112) ,, ,, ,, Accessories, Cones, front, muzzle outer attachment, Mk. II.
(113) ,, ,, ,, Spare Parts A, Disc, muzzle attachment, Mk. II.
(114) ,, ,, ,, Accessories, Tubes, steam.
(115) ,, ,, ,, ,, Plugs, screwed (with link and " S " hook).
(116) ,, ,, ,, ,, Plugs, cork (with chain and 2 " S " hooks).
(117) ,, ,, ,, ,, Protectors, screwed, condenser boss.
(118) ,, ,, ,, ,, Condensers, steam.
(119) ,, ,, ,, ,, Bars, trigger, strengthened.
(120) ,, ,, ,, ,, Springs, trigger, bar.
(121) ,, ,, ,, ,, Catches, safety.
(122) ,, ,, ,, ,, Sights, tangent, No. 2, Mk. II.
(123) ,, ,, ,, ,, Stem tangent sight.
(124) ,, ,, ,, ,, Pin, screwed, axis, tangent sight.
(125) ,, ,, ,, ,, Pistons, tangent sight.
(126) ,, Lewis, ,, Spare Parts A, Balances, spring.
(127) ,, Vickers, ,, Accessories, Slides, tangent sight, Mk. II (assembled complete).
(128) ,, ,, ,, ,, *See* (129).
(129) ,, ,, ,, ,, Springs, safety catch (with piston).
(130) ,, ,, ,, ,, Levers, firing (with pawl).
(131) ,, ,, ,, ,, Pins, screwed axis, safety catch.
(132) ,, ,, ,, ,, Pins, screwed axis, firing lever.
(133) ,, ,, ,, ,, Levers, trigger bar.
(134) ,, ,, ,, ,, Shutters, sliding.
(135) ,, ,, ,, ,, Catches, sliding shutter.
(136) ,, ,, ,, ,, Plungers, sliding shutter.
(137) ,, ,, ,, ,, Springs, sliding shutter catch.
(138) ,, ,, ,, ,, Pins, keeper catch, sliding shutter.
(139) ,, ,, ,, ,, Washers, cup, ·05.
(140) **Oil, general service.** (Section 34.)
(141) **Guns, Vickers ·303 in.,** Accessories, Brushes, oil.

VICKERS GUNS.

INDEX.

A.

	Para.
Action of recoil	24
Adjusting nut	20 (iii)
Adjustment of the gun when assembled with the blank firing attachment	66 (iii)
Adjusting screw	14 (iv)
Adjusting washers, ·003-in. and ·005-in.	20 (iii)
Anchorage of the front cover	7 (iii)
Aperture rear sight	82
Asbestos string	4 (iv)
Asbestos string—renewal of	59, 106
Attachment for the use of the gun with blank ammunition	66

B.

Backward movement of the lock	27
Backward rotation of the crank	26
Barrel Mk. II.	16, 86
Barrel bearing	4 (iv), 78 (iv)
Barrel block	16
Barrel casing	4, 70, 78
Barrel casing—extension of	4 (ii)
Barrel casing—interior of	4 (vii)
Barrel trunnion	16 (ii)
Battle sight	82
Bent on the firing pin	22 (vi)
Bent on the sear	22 (vii)
Bent on the tumbler	22 (v)
Blank firing attachment	66
Blank firing attachment—fitting of	66 (ii)
Bottom plate	11, 72, 84
Breech casing	6, 80
Breech closing safety devices	33
Buffer spring	4 (iii)b

C.

Care and cleaning—general points	50, 100
Care and cleaning—importance of	49
Cartridge grooves in the extractor	22 (xii)
Cessation of fire	32 (iii)
Chamber	16 (iv)
Check lever	6 (iv) *a*
Check lever bracket	6 (iv) *a*
Check lever keeper pin	6 (iv) *a*
Clamp plate	82
Clamp screw	82
Clamp screw split pin	82
Cleaning of guns—general	51, 101
Clear gun	35
Clearing plug	40 (i)
Combination tool	44 (i) *a*
Cocking action of the lock	28
Condensing pipe	78 (vii)
Control of fire	1 (ii), 76 (ii)
Connecting rod	20
Connecting rod spring	19 (iii)
Connecting rod—to adjust the length of	58
Connecting rod—to test the length of	57
Cooling system	1 (iii)–76 (iii)
Cork plug	78 (vii)
Crank	19
Crank, backward rotation of	26
Crank, forward rotation of	30
Crank handle	21
Crank handle—hump of	21 (ii)
Crank handle screw fixing pin	19 (ii)
Crank handle—tail of	21 (ii)
Crank locking pin	19 (i)

D.

Details of stripping the component parts	48–99

E.

Electrical heaters	64–109
Elevating stop	80
Emptying hole	78 (vii)
End cap	4 (iv), 78 (vii)
Examination of the gun—general remarks	53
Examination of the gun—periodically	54, 103
Extractor	22 (xii)
Extractor—cartridge grooves in	22 (xii) *a*
Extractor—horns of	22 (xii) *c*
Extractor lever	22 (iii)
Extractor—shoulder of	22 (xii) *d*
Extractor—to strip	48 (ii)

F.

Feed block—first action of	25
Feed block, left hand	13–85
Feed block, left hand, bottom lever	13 (iii)
Feed block, left hand—exterior of	13 (i)
Feed block, left hand—interior of	13 (ii)
Feed block, left hand, retaining pawls	13 (viii)
Feed block, left hand, retaining pawls screwed axis pin	13 (viii)
Feed block, left hand, retaining pawls spring	13 (ix)
Feed block, left hand, slide	13 (v)
Feed block, left hand, top lever	13 (iv)
Feed block, left hand, top lever cam	13 (iv) *a*
Feed block, left hand, top pawls	13 (vi)
Feed block, left hand, top pawls spring	13 (vii)
Feed block, left hand, top slide lever	13 (iv) *b*
Feed block, left hand—to strip	48 (iv)
Feed block, right hand	12
Feed block, right hand, axis pin	12 (i) *b*
Feed block, right hand, bottom lever	12 (iii)
Feed block, right hand, bottom pawls	12 (viii)
Feed block, right hand, bottom pawls, axis pin	12(viii)
Feed block, right hand, bottom pawls spring	12 (ix)

	Para.
Feed block, right hand, bullet stop	12 (ii) *b*
Feed block, right hand, cartridge stop	12 (i) *d*
Feed block, right hand—exterior of	12 (i)
Feed block, right hand—interior of	12 (ii)
Feed block, right hand, slide	12 (v)
Feed block, right hand, split pin	12 (iii)
Feed block, right hand, top pawls	12 (vi)
Feed block, right hand, top pawls axis pin	12 (vi)
Feed block, right hand, top pawls spring	12 (vii)
Feed block, right hand—to strip	48 (iii)
Feed block—second action of	29
Filling hole	78 (vii)
Firing action—cessation of fire	32 (iii), 90
Firing action—continuous fire	32 (ii), 90
Firing action—opening or resuming fire	32 (i), 90
Firing, lever axis pin	83
Firing, lever pawl	83
Firing lever, thumb piece	83
Firing pin	22 (vi)
Firing pin—bent on	22 (vi)
First action of the feed block	25
Fixing block	63 (ii)
Flash eliminator	67
Foresight	78
Foresight bracket	78 (vii)
Foroto, tool	44 (viii), 62 (iii)
Forward movement of the lock	31
Forward rotation of the crank	30
Front cover	7
Front cover anchorage	7 (iii)
Front cover catch	7 (viii)
Front cover catch, lever	7 (viii)
Front cover catch, plunger	7 (viii)
Front cover catch, plug	7 (viii)
Front cover catch, spring	7 (viii)
Front cover—to strip	48 (v)
Front cover catch—to strip	48 (vi)
Front packing	4 (iv)
Front packing—to renew	59, 106
Fusee	14 (i)
Fusee chain	14 (ii)
Fusee spring	14 (iii)
Fusee spring box	14 (v)
Fusee spring—to weigh	55

G.

General description of gun	1, 69, 76
General description of the parts	2
Gib	22 (xiii)
Gib springs	22 (xiii)
Gib spring cover	22 (xiii)
Gland	4 (iii)
Guide rib	18 (iv)
Gun fired daily or at frequent intervals	51 (ii)
Gun kept in unit armoury or store	51 (iii)
Gun stored and treated with mineral jelly	51 (iv)

H.

Half load	34
Head of the tumbler	22 (v)
Heating system	1 (iv)
Horns of the extractor	22 (xii) *c*
Hump of the crank handle	21 (ii)

I.

Immediate action—definition of	36
Immediate action—general remarks	37
Immediate action involving stripping	40
Immediate action Table	39
Immediate action Table—explanation of	38
Inner side plates	18–88
Inner side plate springs	18 (iii)
Inner side plates guide rib	18 (iv)

J.

Joint cover pin	6 (ii)

K.

Keeper screw	78 (viii)

L.

Lead	16 (iv)
Left hand inner side plate	18
Left slide	6 (iii)
Loading by hand	91
Loading handle	65, 110
Loading handle—to fit	65 (ii)
Lock	22
Lock—backward movement of	27
Lock casing	22 (i)
Lock casing extractor stop	22 (i) *b*
Lock casing flange	22 (i) *f*
Lock—cocking action of	28
Lock—forward movement of	31
Locking washer	4 (iii) *c*
Lock—repairs to	60
Lock spring	22 (vii)
Lock spring—to weigh	59 (vii)
Lock—to change	40 (ii)
Lock—to strip	48 (i)
Lubrication of the gun	52, 102

M.

Mechanical process of loading with loading handle	34
Mechanical process of unloading	35
Mechanism	23, 89
Muzzle attachment	4 (ii) *a*
Muzzle attachment, locking washer	4 (iii) *c*
Muzzle attachment, outer casing	4 (ii) *b*
Muzzle attachment, outer casing—to strip	48 (viii)
Muzzle attachment, split pin	4 (ii) *b*
Muzzle cone	78 (ii)
Muzzle cup	17, 87
Muzzle cylinder	4 (ii) *c*
Muzzle disc	78 (ii)
Muzzle gland	4 (iii)

N.

Non-recoiling portions	3, 77
Nose of the trigger	22 (iv)
Nose of the tumbler	22 (v)

O.

Oil Brushes	83
Operating angle bracket	63 (vii)

CHAPTER 1.
INDEX.

	Para.
P.	
Points to be observed after a flight or butt practice	43
Points to be observed before a flight or butt practice	41, 93
Points to be observed during flight	42, 94
Position of stoppages	37
Preliminary cleaning	51 (ii) *a*
Principal and second cleaning	51 (ii) *b*
R.	
Ramps	8 (iii)
Rear cover	8
Rear cover lock	8 (v), 82
Rear cover lock axis pin	8 (v)
Rear cover lock spring	8 (v)
Rear cover lock—to strip	48 (vii)
Rear cover—to strip	48 (v)
Rear cross piece	9, 83
Rear cross piece axis pin	9 (ii)
Rear packing—to renew	106
Rear sight bracket	82
Re-assembling the gun	47–98
Recess in the prolongation of the inner side plate	18 (vii)
Recoiling portions	15
Recoiling portions—to weigh	56, 105
Repairs and adjustments	55, 104
Retaining ring	78 (vii)
Right hand inner side plate	18
Right slide	6 (iii)
Roller	6 (iv) *c*
Rounds counter	63, 108
Rounds counter—action of	63 (viii)
S.	
Safety catch	82
Safety catch axis pin	83
Safety catch piston	83
Safety catch spring	83
Safety chain	78 (vii)
Safety devices on the breech	33
Screwed plug	78 (vii)
Sear	22 (vii)
Sear—bent on	22 (vii)
Sear spring	22 (vii)
Second action of the feed block	29
Shoulder of the extractor	22 (xii) *d*
Side lever	22 (ii)
Side lever axis bush	22 (ix)
Side levers axis bush, split pin	22 (ix)
Sights for Mk. I gun	76 (i)
Sight stem	82
Sliding shutter	84
Sliding shutter catch	84
Sliding steam valve	78 (viii)
Solid cam	6 (iv)
Spare parts and tools	61
Spare parts and tools to be taken in the air	62, 107
Spring balance	55, 56
Steam escape tube	78 (vii)
Steam tube	78 (vii)
Stoppages—position of	37
Stripping—general remarks	44, 95
Stripping the gun	46, 97
Stripping the gun—sequence of	45, 97
T.	
Table of immediate action	39–92
Tail of the crank handle	21 (ii)
Tail of the trigger	22 (iv)
Tail of the tumbler	22 (v)
Tail of the sear	22 (vii)
Tangent rear sight	82
Tangent sight piston	82
Tangent sight piston spring	82
Tangent sight screw	82
"T" fixing pin	10
Third and subsequent cleaning	51 (ii) *c*
Thumb wheel	82
Training handles	83
Trigger	22 (iv)
Trigger—nose of	22 (iv)
Trigger—tail of	22 (iv)
Trigger axis pin	22 (xi)
Trigger bar	82
Trigger bar lever	83
Trigger bar spring	82
Trunnion block	5, 71, 79
Trunnion block, distance bush	5 (ii)
Tumbler	22 (v)
Tumbler axis pin	22 (x)
Tumbler—bent on	22 (v)
Tumbler—head of	22 (v)
Tumbler—nose of	22 (v)
U.	
Use of the clearing plug	40 (i)
W.	
Washer, ·05 inch	87
Weighing lock spring	54 (vii) *f*

This manual has been scanned by the

Vickers MG Collection & Research Association

www.vickersmg.org.uk

Please support the work of the Association.

Click on the image to donate through PayPal:



Or regularly support us through Patreon:



A not-for-profit company, limited by guarantee, registered in England, Company Registration Number 07855202